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CONTENTS

VOLUME 69 **MARCH, 1941** *NUMBER 3*

PAGE

Editorial ... 33

Producing Sand Casting in Magnesium Alloy ... 34
By M. E. Brooks and A. W. Winston

Gating Nonferrous Castings Is Important ... 38
By N. K. B. Patch

Increasing Silicon with Silvery Iron ... 40
By Bradley H. Booth

Arrange Program for New York Convention ... 42

Reducing the Amount of Core Gas ... 43
By Harry W. Dietert

Foundry Progress Aids Nation's Defense Effort ... 44

Cleveland Has National Defense Training Program for Foundry Workers ... 46
By James G. Goldie

Questions and Answers ... 48

Men of Industry ... 52

The Adventures of Bill ... 60
By Pat Dwyer

A. F. A. Nominates Officers and Directors ... 65

Readers Comment ... 70

Foundry Developments at Short Range ... 73

Among Detroit Foundries ... 76
By A. H. Allen

Activities of Foundry Groups ... 80

Comment ... 99

New Equipment and Supplies ... 100

Obituary ... 104

Foundry Activities ... 107

Abstracts from World Literature ... 128

Where-to-Buy Directory ... 131

Reviews of Manufacturers' Literature ... 147

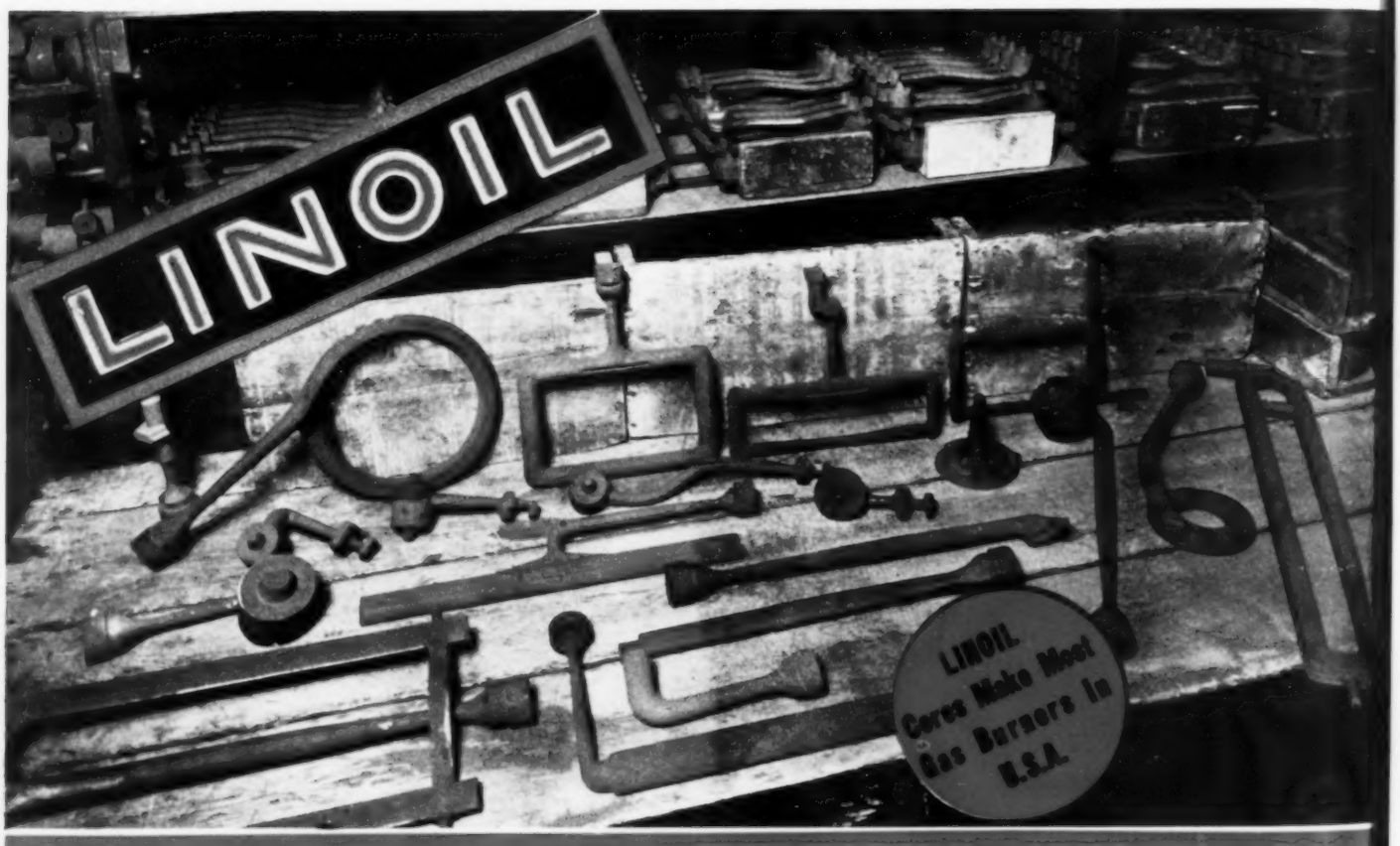
Index to Advertisers ... 164

U.S. Dinner Demands Increase

Beauty of New Models and Greater Heat Efficiency Keep Gas Stove Assembly Lines Going at Top Speed

TIME was when gas stoves were a novelty and a burner core was a simple ring and stem. Today burners take on a multitude of strange shapes and sizes as science continues to find ways to develop better cooking heat and to place it to better advantage.

Burners are light castings but the quantity used runs into heavy tonnage.



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EDITORIAL

Defense Work To Be Spread Through Subcontracts

CONSIDERABLE divergence of opinion may be found in Washington regarding the effect of the present defense program on industrial production. Some believe it possible to superimpose the demands of a 16½ billion dollar armament program upon the reasonable peace time needs of this country without serious difficulty. Others feel that the normal civilian economy must be limited considerably as the strain on the nation's industrial plant, resulting from government purchases, reaches a peak. Experience in the previous war, coupled with situations already developing in connecton with the shortages of certain rather essential materials, indicate clearly that total defense is not compatible with normal peace time production requirements. In any event, industry must meet the desired production schedules for army and navy materials. If those now at OPM fail, willing hands among the new dealers will take over the job and private initiative will be doomed.

Recent moves in Washington which are of particular interest to industry include a general reorganization of the priorities division of the Office of Production Management, and the drive toward the more complete utilization of the entire industrial production facilities through subcontracting. While the necessary machinery is being established to handle priorities in specific fields, use of priorities, which are looked upon simply as tools to help out production and procurement schedules of the army and navy, will be limited as much as possible under present plans. The priorities committee is rather anxious that through timely preparation of administrative mechanisms, proper planning and the ability of business men to make proper arrangements with each other in the matter of procurement of materials and machines, the need of mandatory priorities will not be extensive. In this connection it already has been pointed out that avoidance of hoarding would reduce greatly the need for formal priority orders.

If the defense effort is to be accelerated, the manufacturing facilities of the entire nation must be employed. Since approximately 80 per cent of the primary contracts for military and naval procurement is concentrated along the East and West coasts, the OPM has organized the Defense Contracts Service to aid the primary contractor in spreading the defense work wherever industrial facilities are available or to help those plants not now engaged in defense work to secure subcontracts. The service will function in each of the 36 banks of the Federal Reserve system, where a full time staff, headed by a prominent manufacturer, will have the necessary data on plans, specifications and manufacturing facilities to bring primary and possible subcontractors together. Frequently costs of materials produced by subcontractors may be higher than would be the case if the materials were produced by the primary contractor, who may have the equipment and practice best adapted to the particular manufacturing problem. But time, not cost, is the important factor. Some primary contracts now contain an *escalator* clause providing for higher prices if increased costs are encountered in the fulfillment of the contract, and it is hoped some action can be taken to make such a clause effective in the case of subcontracts.

To meet the immediate demands of the army and navy and at the same time provide for at least a portion of normal civilian requirements, the nation does not need more bricks and mortar in the form of new industrial buildings, but the more complete utilization of machines and equipment already available and not as yet engaged in meeting these problems of procurement. This situation is quite applicable to the foundry industry where a considerable number of new plants and shop additions have been built or are well under way. Although the foundry industry has secured much of its present government business through subcontracts, sufficient capacity is available to handle a much heavier demand, providing the orders are spread over a larger number of plants. The present trend indicates many of the lessons of the 1914-18 era already have been forgotten.

Frank G. Steinebach

Editor

PRODUCING S

By M. E. Brooks

and A. W. Winston

Dow Chemical Co.
Midland, Mich.

INTRODUCED practically in 1929, production of magnesium alloy sand castings increased ten fold during the following decade to reach more than a million pounds in 1939, according to government statistics. It is estimated that production in 1940 rose to about four million pounds and will more than double again during the current year. At least a score of foundries are casting magnesium, providing convenient availability in all major industrial areas througout the country.

Lightness is the outstanding characteristic of magnesium castings. Cast iron is four times, brass five times, and even aluminum is 50 per cent heavier than magnesium. This light weight, combined with adequate mechanical properties, has led to the use of magnesium castings in a wide variety of applications in which reduction of weight is needed. These include portable tools, textile and packaging machinery, transportation equipment, and large ventilating fans.

Largest castings regularly made are thousand-pound bases and housings for pumps to be mounted on trucks, as shown in Fig. 1. Of great na-

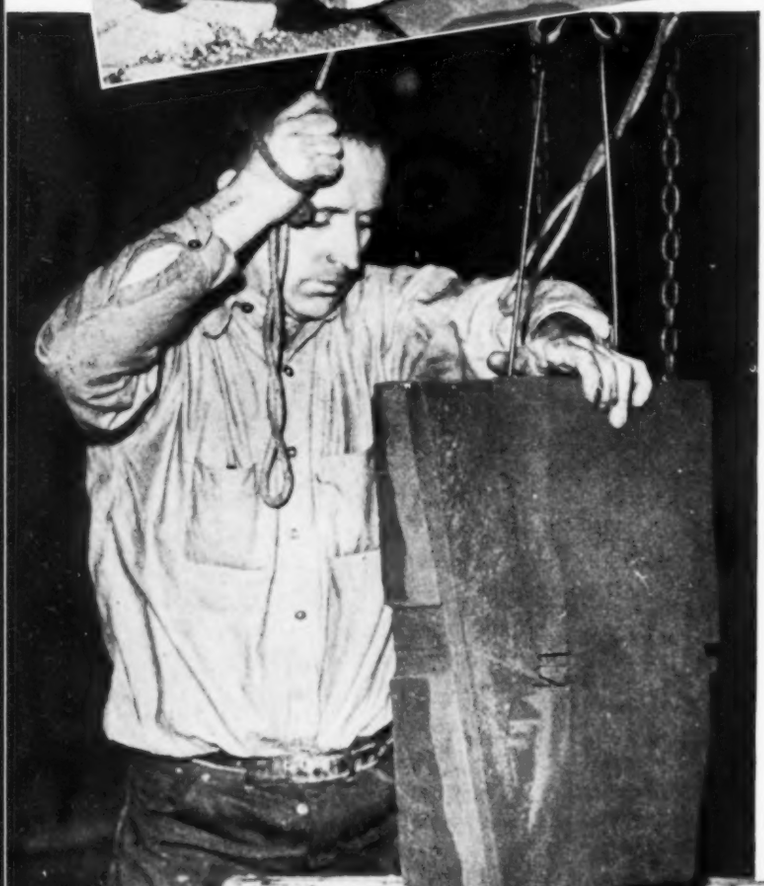


Fig. 1 (Above)—A 950-pound magnesium alloy pump housing for use on a portable unit. It is the largest magnesium sand casting regularly made in the United States. Photo courtesy Dow Chemical Co. Fig. 2 (Left)—Placing cores in large wheel mold calls for skill and steady hand. Photo courtesy Magnesium Fabricators Inc.

SAND CASTINGS OF Magnesium Alloys

tional interest at this time are the many applications in the aircraft industry, the largest consumer of magnesium castings. Here they are indispensable for engine parts, landing wheels, airplane structural fittings, and many accessory and instrument parts, shown in Fig. 2.

Sand foundry practice for magnesium alloys is similar in general principles to that used for other metals. However, there are numerous points of difference, necessitated by the ease of oxidation of magnesium at temperatures above the melting point of approximately 1125 degrees Fahr., by a rather high shrinkage (3/16-inch per foot when unrestrained) and by the low density of the molten metal, which is slightly more than 1.5 at 1300 degrees Fahr. The first of these characteristics requires that oxidation inhibiting agents be present in the sand and that special fluxes be used in the melting operation.

Outlines Magnesium Molding Practice

Special methods of gating, venting, and risering castings have been developed to offset the problems due to the high shrinkage and to the light weight of the molten metal. The procedures described in the following discussion may be considered to present American practice fairly completely. There is, however, no attempt to cover all the operating *kinks* in use in individual foundries, nor to make comparisons with European practice.

Magnesium sand castings are made in green sand molds or, less commonly, in dry or baked sand molds. The latter are similar to baked sand cores in composition and treatment. Magnesium castings are molded in both natural and synthetic sands. It is desirable that the sand should be as open as possible consistent with obtaining the degree of surface smoothness required.

More open sand is desirable for two reasons: First, magnesium alloys are so light that an open sand permits the metal to flow into the mold cavities with very little back pressure from the air in the mold. Second, the open sand requires less tempering water and evolves less steam. Also it permits the steam generated to escape quickly, thus decreasing the tendency for reaction between the steam and metal.

Natural sands of the Albany and Champion types are used in several foundries. The average grain fineness is from 100 to 150 with an A. F. A. permeability ranging from 10 to 25. They contain 10 to 12 per cent clay and require about 6 per cent water for tempering. Foundries operating with natural sand generally use the heap method and recondition their sand with equipment of the aerator type with only occasional mulling if any.

The high water content of the natural sands results in considerable steam formation as the

Fig. 3 (Right)—Thin walls require accurate setting and gaging of cores. Photo courtesy Dow Chemical Co.

mold is filled. This fact, combined with poor venting due to low permeability, necessitates the use of rather high quantities of inhibitive agent to prevent surface oxidation or burning. As much as 10 per cent agent may be added, and this amount may not be adequate on heavy sections.

More open sands should be used if any sections more than 2 inches thick are encountered regularly. Misruns, cold shuts, and other casting defects also may be caused by too slow venting of the mold air during the filling of the mold. Subject to the limitations described, natural sands may be used successfully for the production of light to medium-sized castings.

Increase Use of Synthetic Sand

Synthetic molding sand is being used to an increasing extent in magnesium foundries; in fact, it will be used in all of the several larger foundries recently started or being built at this time. The synthetic sands preferably are made up from a washed silica base with an A. F. A. grain fineness of 65 to 100, mulled with 3 to 4 per cent bentonite and about the same amount of water. Bank sands also may be used if free from roots, coal, or other organic matter which might cause blows.

The sand is conditioned after each use; tempering, mulling, and aerating in standard equipment. Care should be taken to remove wood and paper particles as they absorb moisture from the sand and cause blows if contacted by hot metal. Contamination with iron scale or rusty iron particles such as steel wire and shot should be avoided, as these also will cause blows.

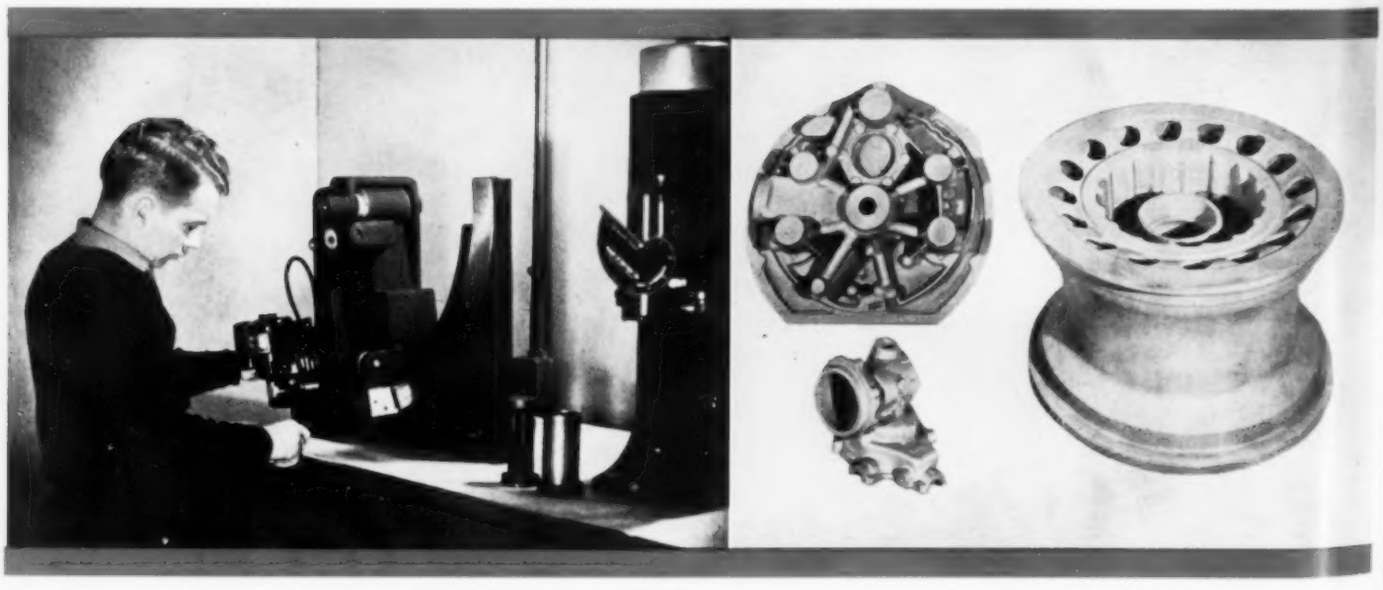
Considerable latitude exists in synthetic sands and the following A. F. A. properties may be considered typical of satisfactory sands of various grain sizes:

	A	B	C
Average grain size ..	100	80	65
Permeability	35-50	60-75	120-150
Bentonite—per cent ..	4	4	4
Water—per cent	4.5-5.0	3.8-4.2	3.3-3.7
Compression Strength, lb./sq. in.	6	6.5	6.5

The strength will be affected slightly by the kind and amount of addition agent in the sand and greatly by mulling, which should be done thoroughly between each use. The finer sand (*A*) will give the best casting surface but will possess to some degree the disadvantages of fine natural sand as discussed earlier. Very open sands, such as given under (*C*), while entirely adequate from the permeability standpoint, tend to dry out easily and to give rough surfaces on the castings. The former tendency is overcome in American practice by the use of approximately 1 per cent of ethylene glycol in the sand. Smoking of the mold surface is practiced in foundries using such open sands and may be of value in improving the casting surface. In the opinion of the authors an intermediate sand such as given under (*B*) is preferable for general use. It yields a fairly good casting surface and has proved satisfactory for castings weighing up to 1000 pounds and for sections up to 8 inches in thickness. It is easier to work than coarser sands and will stand for considerable variation in ramming conditions.

Excessive bentonite causes the sand to become sticky and difficult to work. Additions to the sand will be required occasionally. To avoid lumps in infrequently mulled heaps, the bentonite may be suspended in the tempering water.

Fig. 4 (Left below)—Sand control is the rule in magnesium foundries to insure production of quality castings. Fig. 5 (Right below)—Magnesium alloy landing wheels and engine parts are typical sand castings for aircraft use. Photos courtesy Dow Chemical Co.



It is necessary that all green molding sand be treated with a chemical agent to inhibit the action of the water vapor upon the hot metal. The

Fig. 6 (Below)—Cores for aircraft engine castings must be made carefully to meet existing standards. Photo courtesy Wright Aeronautical Corp. Fig. 7 (Right)—Before wheel cores are used they are inspected carefully for accuracy. Photo courtesy Dow Chemical Co.

first inhibitors were developed by German foundrymen who discovered that sulphur and boric acid would protect magnesium-base alloys cast in green sand. Later research in this country has shown that there are a large number of chemicals which will serve as inhibitors. Of these, various fluoride salts are particularly effective. American foundries at present are using combinations of several agents. One is a mixture of sulphuric acid, borax, and sulphur, practically equivalent to boric acid and sulphur in protective value. Better protection, especially necessary with low permeability sands, is obtained by replacing part of the sulphur and boric acid with fluoride salts. Originally ammonium acid fluoride and ammonium borofluoride were used for this purpose, but they have been replaced largely by the cheaper ammonium silicofluoride.

In general, the total amount of inhibiting agent will range from four to ten per cent by weight, depending on the sand used and the section thickness of the castings produced. The larger amounts will be required for lower permeability sands and for massive castings. The concentration of agent slowly decreases as the sand is used and more must be added to maintain the proper degree of protection. A convenient control method is to hold the total water-soluble salts, as indicated by a simple analysis, within set limits by the addition of ammonium silicofluoride and boric acid. Powdered sulphur additions are made as indicated necessary by a determination of the carbon disulphide-soluble content of the sand.

Cores for magnesium castings should be made from an open sharp sand and should be provided with adequate vents to facilitate removal of hot gases. Most core troubles can be traced to lack of attention to details ensuring a minimum of gas evolution or to fail- (*Please turn to page* 122)

Gating

Nonferrous Castings Is Important

By

N. K. B. Patch

IN GATING nonferrous castings the problem of the choice of gate for any given design of casting arises. Obviously, there are a number of ways that a given casting might be gated, of which several might yield equally good results.

One design of a pattern for a given casting may differ from another and yet both may make equally satisfactory castings. Gating of either of the patterns might be similar or might require marked differences in design. That, of course, would be influenced by the position of cores. Some patterns are designed with considerable core work to avoid back drafts, and other patterns are designs so that they draw from the sand with few cores. Both practices result in identical castings, but each requires its specific design of gate if best results are to be secured. In some instances the gates may be identical.

What should influence the choice of gates when two alternatives are suggested? It would seem that the most important consideration in choosing the gate for a given pattern is to have metal enter the mold at the right point or points so that the mold is filled with the minimum destructive effect upon the mold shape and so that a minimum amount of agitation takes place in the metal as it enters. Furthermore, the gate must be such that the last part of the casting to solidify will be fed by the risers provided. Consideration must be given to the problem of providing the correct gating to lead the metal into the risers without undue restrictions.

The foundryman next must determine whether a multiple series of gates is preferable to a single gate. If a multiple series is to be used, a further problem is provided in deciding where these several gates are to be connected and the size of gates to be used. Obviously the runner that

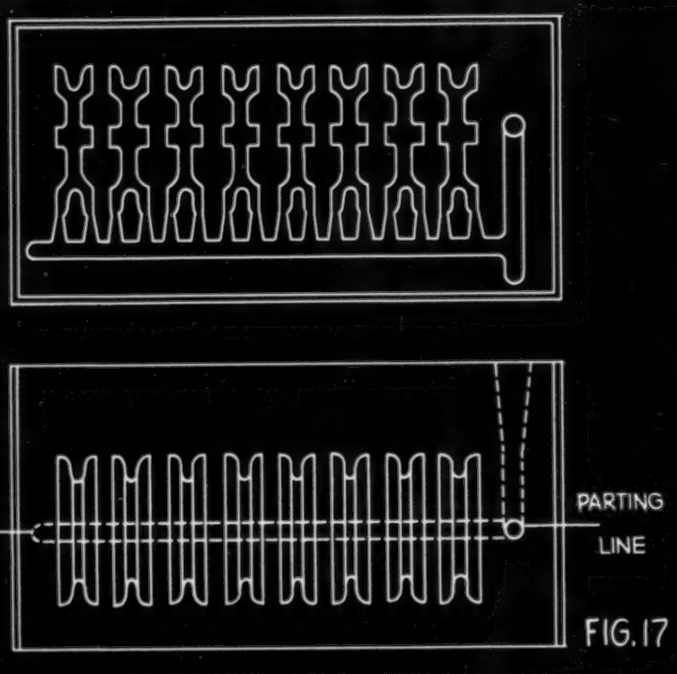


FIG. 17

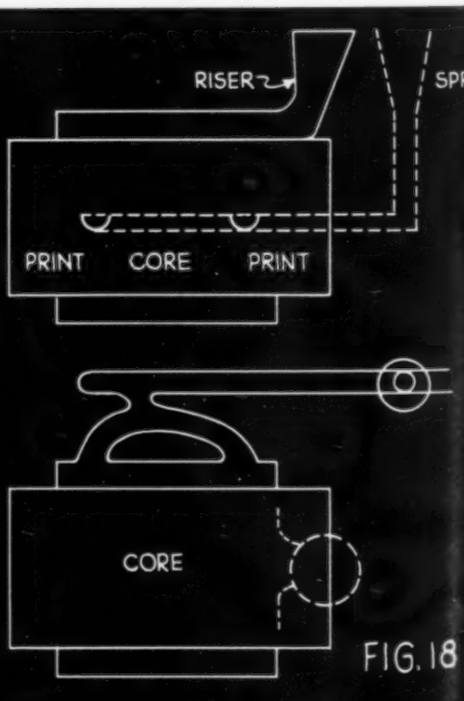


FIG. 18

feeds the multiple gates must be sufficient in size to supply all gates simultaneously with an adequate amount of metal to insure their full operation. If one gate starts to flow and then, due to inadequate supply, ceases to flow, it is entirely possible that the little metal that first entered the mold may freeze and not knit with the remainder of the casting, thus producing a defect.

The next question concerns the size and location of the sprue so that all gates will have a uniform supply of metal. If a very large sprue is required to supply an adequate quantity of metal for gates, it often may be found preferable to use two sprues. One large sprue may produce a whirlpool and suck down with the inflowing stream of metal the surface scum formed on the hot metal or even go so far as to suck air from the room which will mix with the metal to produce defective castings. Therefore, it is preferable to use two or more similar sprues.

Poured From Two Pots

These may be connected at the top with a pouring basin or may be located at different points in the mold and poured from two separate pouring pots, as convenience dictates and as the design of the gating with respect to the casting to be produced influences the convenience of production. Primarily we are planning the gating of castings with the thought of making good castings as the primary objective, but we also are attempting to make these good castings at a minimum cost. Therefore, the problem of gating is influenced by production convenience as well as the development of the ideal casting conditions.

Two different ways of gating a trolley wheel or sheave are illustrated in Figs. 17 and 19. It will be noted that in the one instance the groove as molded is in a vertical position and in the other example in a horizontal position. Such a sheave also might be produced by a number of other methods. The groove may be produced by a dry sand core or a green sand core held on a tray or plate or the green sand core might be rolled over by the double roll-over process.

Bushing Castings Poured From Top

Figs. 18 and 21 illustrate two ways of making a straight bushing having a relatively large diameter and thin wall. Either of the procedures illustrated are a matter of choice on the part of the foundryman, depending on which he prefers to adopt or which his equipment lends best itself. Fig. 20 illustrates a third method of gating which now is being advocated by some foundrymen for some of the compositions frequently cast in the nonferrous foundry.

We refer to the practice of gating from the top and pouring directly through these top gates into the mold cavity without the use of runners, a practice commonly called drop pouring or pot gating. There are many things in favor of this practice where conditions insure the minimum amount of trouble. Obviously by pouring through the top of the mold down into the mold cavity the last metal into the mold is at the top and consequently the top of the casting is the last to cool. If the gates are proportioned correctly they become the feeders from which the hot metal is led into the top of the casting.

There are objections (*Please turn to page* 117)

Fig. 17—Method of gating sheaves poured vertically. Fig. 18—Thin-wall bushing poured horizontally is gated along joint. Fig. 19—Sheave molded horizontally poured with horn gate. Fig. 20—Bushings may be poured through a ring of pop gates. Fig. 21—Vertically molded bushings poured from the bottom

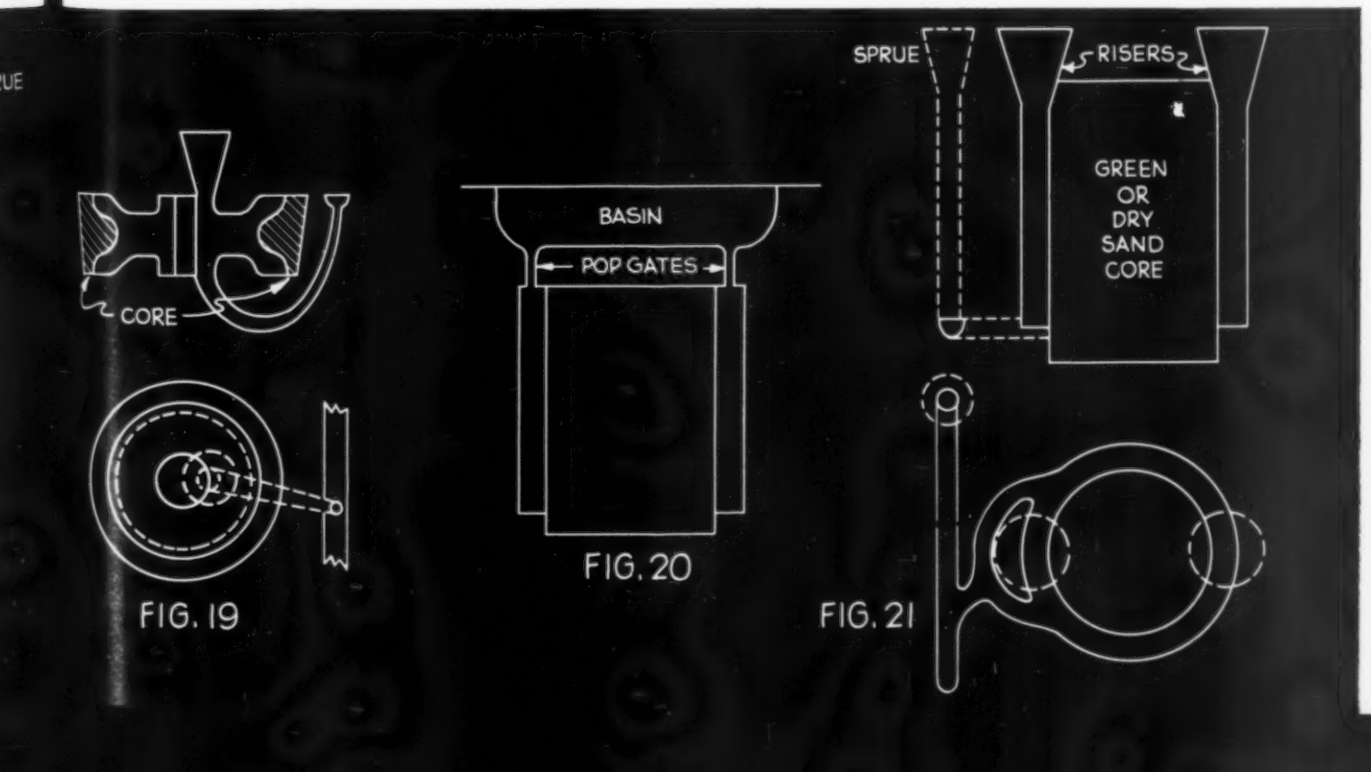


FIG. 19

FIG. 20

FIG. 21

Increasing Silicon with Silvery

PIG IRONS fall into two groups, those containing less than 5 per cent silicon and those containing more than 5 per cent silicon. The foundry, malleable, basic and bessemer grades are in the first classification, while the silvery pig irons, which are made with silicon content ranging from 5 to 17 per cent, are included in the second group. The percentage of contained silicon, then, is the basic distinguishing feature between silvery and all other grades of pig iron, although there are certain fundamental differences in furnace practice which make silvery irons more closely related to charcoal pig iron than to coke-smelted pig irons.

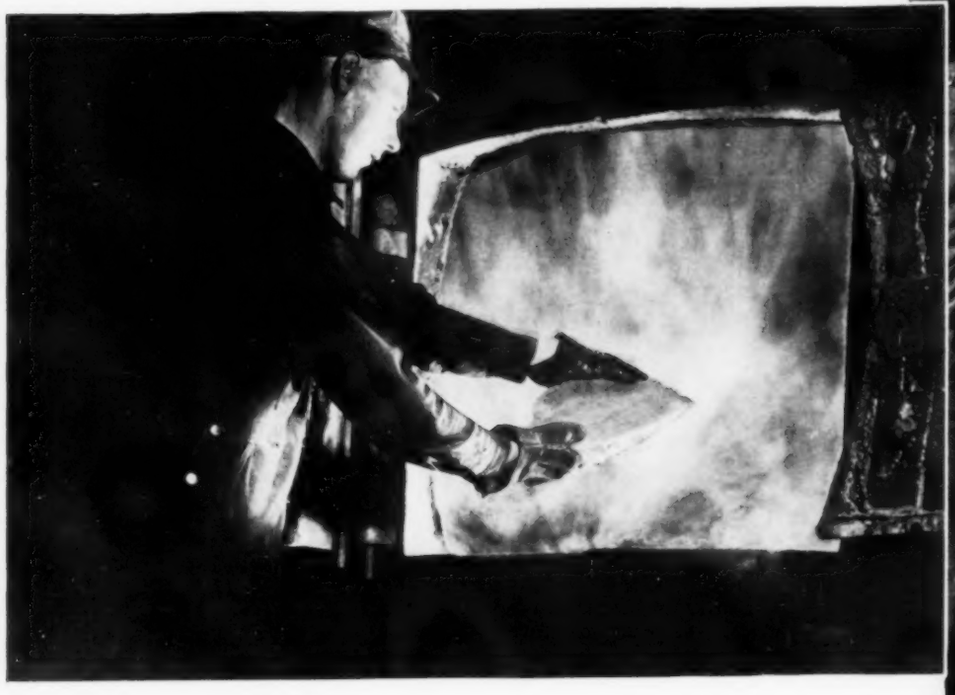
Silvery pig iron is an important source of silicon for cupola charges containing low silicon pig, much gray iron scrap, or steel. Its use in the foundry has grown steadily with the advent of high strength gray irons, of duplex melting involving the use of the cupola for malleable iron, and of high scrap charges. The low carbon content of silvery iron makes it adapted in such cases where the carbon content of the charge and the iron produced must be held to a minimum. Grades of silvery iron containing high manganese, phosphorus, or other common alloying elements such as copper, chromium or nickel, provide an effective means for introducing such elements into mixtures melted in the cupola.

Common practice is to use from 3 to 20 per cent of silvery iron in mixes which have high percentages of scrap and steel. Such mixes are economical and lend themselves readily to the production of quality iron of high strength, close grain structure, and superior machinability for a given hardness. Cast irons with tensile strengths of from 30,000 to 50,000 pounds per square inch, depending on analysis and the amount of steel used in the mix, now are being made successfully from such charges.

Three typical mixes used in some gray iron foundries are listed in the following paragraphs.

(1) For high strength, close-grained iron of from 40,000 to 50,000 (*Please turn to page* 110)

Fig. 1 (Below)—Careful charging of cupola is essential, and here the operator is placing a piece of silvery pig iron. Fig. 2 (Right)—Exact weighing of materials forming the iron charge also is important. Fig. 3 (Extreme right)—Telescope wheel casting. Photos courtesy of Sterling Foundry Co., Wellington, O.



Iron

By
BRADLEY H. BOOTH
Metallurgist
Jackson Iron & Steel Co.
Jackson, O.

PROGRAM ARRANGED FOR NEW YORK CONVENTION

THAT the technical program of the Forty-fifth annual convention of the American Foundrymen's association, to be held in New York May 12-15, will be filled with discussions of vital interest to foundrymen is indicated by the tentative plans recently announced. The schedule of sessions, presented on page 120, provides 35 meetings covering all branches of the industry, research, shop practice, management and engineering groups. An unusually imposing array of experts has been secured to present papers, many touching on phases important in the National defense program.

Presentation of these papers, with committee reports, will start Monday, May 12, in the rooms of the Hotel Pennsylvania, convention headquarters. Wednesday, May 14, has been designated as the day for the annual awards board lecture, the business meeting and the annual association dinner. The awards board is selecting an outstanding national speaker as the awards lecturer.

Foundry training, a most important subject, will be emphasized at the apprentice training session, with W. E. Patterson, Federal committee on apprenticeship, speaking on "Apprentice Training in the Defense Program." The A. F. A. committee will discuss, as a symposium, related instruction for the pattern and foundry apprentice in theory and in shop practice.

Safety and hygiene will be discussed at a special session by Roger Williams, assistant director, Inspection and Safety Service department, New York State Insurance fund. This meeting will be a continuation of the series developed under the auspices of the Safety and Hygiene section of the A. F. A.

The four sand shop course sessions will have the following discussion leaders: *Nonferrous,* F. W. Hunter, Sargent & Co., New Haven, Conn.; *Malleable,* D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.; *Gray Iron,* C. P. Randall, Hunt-Spiller Mfg. Corp., Boston; *Steel,* W. G. Reichert, American Brake Shoe and Foundry Co., Mahwah, N. J.

The four gray iron shop course sessions will have as discussion leaders the following: *Cupola Practice,* Donald J. Reese, International Nickel Co., New York; *Gating and Risering,* Elmer J. Carmody, C. C. Kawin Co., Chicago; *Electric Furnace Melting,* A. E. Rhoads, Detroit Electric Furnace division, Kuhlman Electric Co., Bay City, Mich.; *Casting Defects and Remedies,* A. F. A. committee on analysis of casting defects. The 1941 AFA lecture, which will cover four sessions, will feature "Core Practices and Theories," with Harry W. Dietert as the lecturer. Mr. Dietert is being assisted in the preparation of his material by many men throughout the (*Please turn to page* 120)

REDUCING THE AMOUNT OF Core Gas

By HARRY W. DIETERT
President
Harry W. Dietert Co., Detroit

FOUNDRYMEN without exception desire a reduction of the amount and the rate of liberation of gas driven from cores during and after the pouring of a casting. This gas is undesirable from the quality of the casting and from pollution of foundry atmosphere with an offensive odor. Gas may be held to a minimum amount in several ways. While one may assume off hand that the fineness of the sand need not be considered, the fact remains that the fineness factor does enter into the problem. The coarser the sand, the greater the permeability of the core. The greater the permeability, the better the core will be baked. This means that the binder has absorbed a maximum amount of oxygen and will produce less gas when the casting is poured. Fig. 1 is a graphical illustration of how the quantity of gas in a core is reduced as the fineness of the core sand is changed from A. F. A. fineness number 75 to number 40. The total amount of gas may be reduced by using a coarser sand.

One other factor must (*Please turn to page* 119)

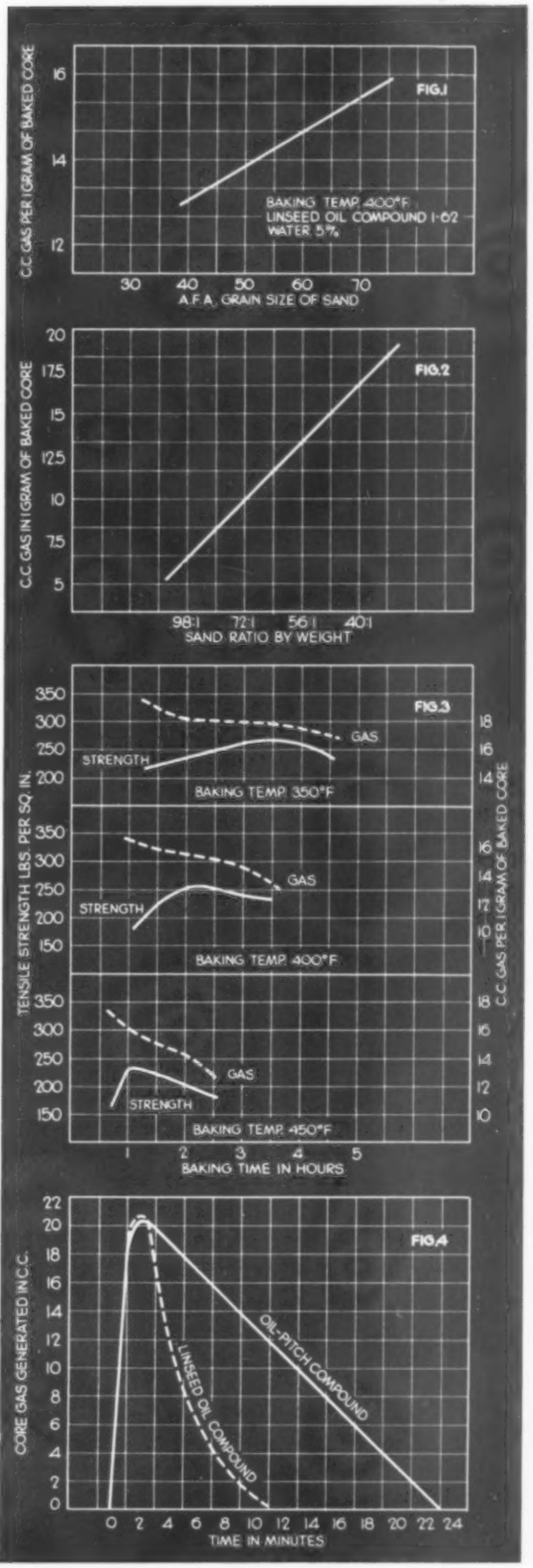


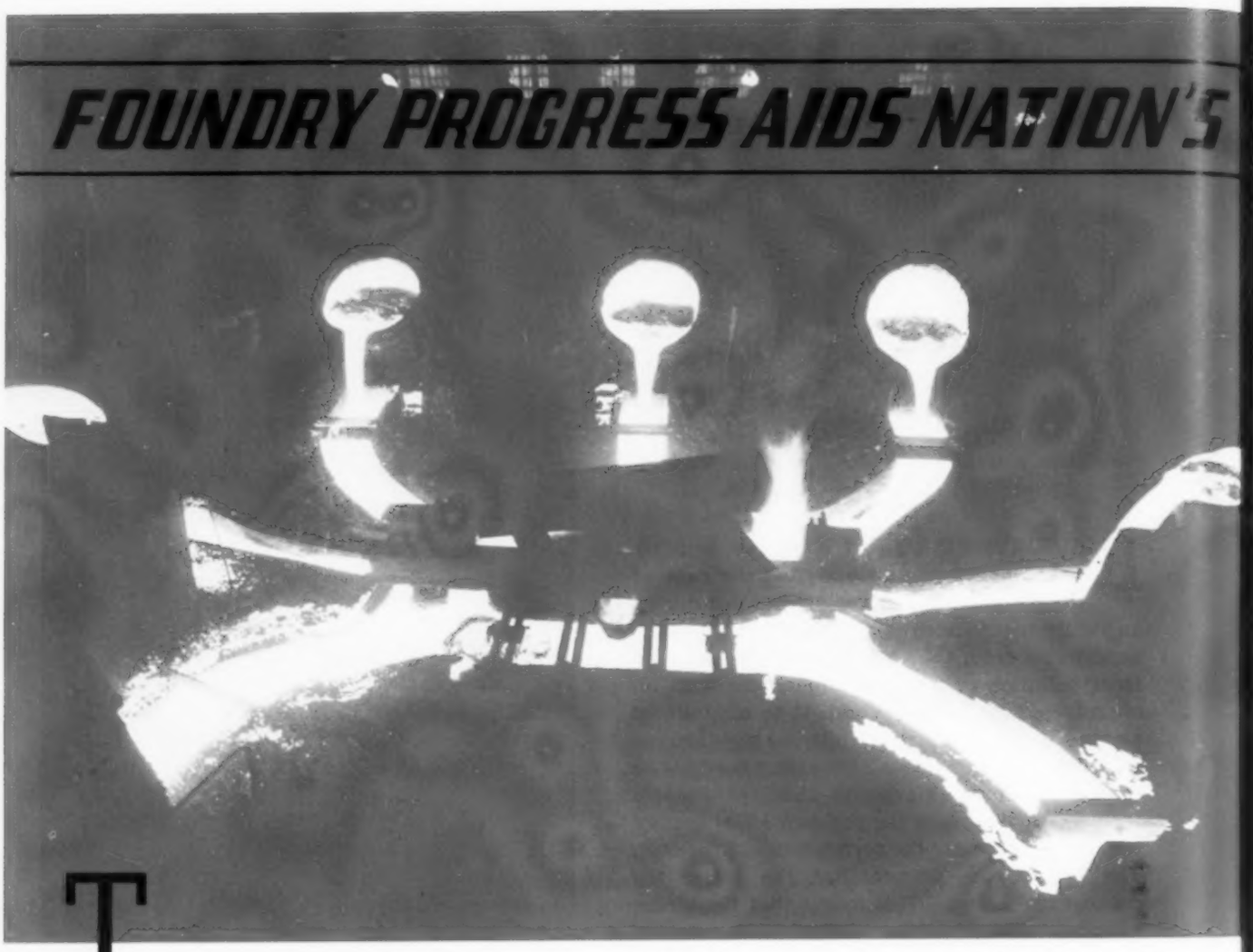
FIG.1
C.C. GAS PER I GRAM OF BAKED CORE
16
14
12
BAKING TEMP. 400°F.
LINSEED OIL COMPOUND 1-62
WATER 5%
30 40 50 60 70
A.F.A. GRAIN SIZE OF SAND
FIG.2
C.C. GAS IN I GRAM OF BAKED CORE
20 17.5 15 12.5 10 7.5 5
98:1 72:1 56:1 40:1
SAND RATIO BY WEIGHT
FIG.3
TENSILE STRENGTH LBS. PER SQ. IN.
350 300 250 200 150
GAS
STRENGTH
BAKING TEMP. 350°F
BAKING TEMP. 400°F
BAKING TEMP. 450°F
18 16 14 12 10
C.C. GAS PER I GRAM OF BAKED CORE
1 2 3 4 5
BAKING TIME IN HOURS
FIG.4
CORE GAS GENERATED IN C.C.
22 20 18 16 14 12 10 8 6 4 2 0
OIL-PITCH COMPOUND
LINSEED OIL COMPOUND
0 2 4 6 8 10 12 14 16 18 20 22 24
TIME IN MINUTES

Fig. 1—Core gas affected by grain size of core sand. Fig. 2—Effect of sand-oil ration on core gas. Fig. 3—Tensile strength and core gas affected by baking temperature. Fig. 4—Rate of gas evolution per 5 grams of core

Relation of Gas Content To Baking Temperature

Baking Temperature Degrees Fahr.	Gas c.c. at Maximum Tensile Strength	Maximum Tensile Strength	Gas c.c. at End of Bake	Tensile Strength End of Bake
350	17.8	267	17	237
400	15.2	255	13.4	230
450	15.8	235	12.8	177

FOUNDRY PROGRESS AIDS NATION'S D



Seven ladles were used to pour a 175-ton ingot mold at Bethlehem Steel Co., Bethlehem, Pa.

TECHNICAL and managerial progress in the production of castings is revealed in a group of comments from industrial leaders presented in the February issue and concluded in this number. The comments were solicited originally by the editors of *Steel* for use in its Yearbook of Industry issue of that publication, and are reproduced here because of the exceptional interest to readers of THE FOUNDRY.

Cast Steel Armor Plate Manufacture Is Outstanding Development

By JOHN HOWE HALL
Consultant
Philadelphia

STEADY and insistent demand for thoroughly sound steel castings, coupled with increasing use of radiographic examination, has resulted in greatly increased knowledge of steel casting defects and the best means of preventing their occurrence. There has been a re-examination of the basic principles underlying the art of casting design and production, and an intensive effort to apply those principles in practice. Both designers and foundrymen have made use of the data obtained and the resulting discussion of foundry problems and methods.

Features of design that make it difficult to obtain sound castings are being eliminated through better understanding of the subject on the part of designers. The foundryman, at the same time, realizing that much of his product in the past has been less sound than he supposed, has improved his practice in many respects. Not the least of these is the realization that much metal has to be added to castings at various places and machined off or otherwise removed at considerable expense, if the job is to be thoroughly sound at vital points. Recent discussions at sessions of the American Foundrymen's association and the Steel Founders' society, have contributed to prog-

DEFENSE EFFORT

ress along these lines, and the handbooks of those organizations are a most valuable contribution.

Tendency to combine steel castings and rolled or forged parts by welding, has been accentuated rather than the reverse, by a wider understanding of the difficulties in securing soundness in castings of complicated shape, with widely varying sections. Castings are being welded into assemblies of rolled and forged steel, and on the other hand, parts of castings are being left off the patterns and welded to the finished casting. In many cases, the final result is to substitute a welded seam at a junction for a cast area that has to be extensively chipped out and repaired by welding, at higher cost than that of the cast-welded product. In many lines involving the production of castings of large area and varying sections, complicated by the presence of many intersecting members, it is greatly to be hoped that this tendency to call in the welder to assist the foundryman will increase rather than decrease in the immediate future.

Development of methods and equipment for the manufacture of cast steel armorplate for mobile equipment has been one of the outstanding accomplishments of the industry during the year.

Extend Application of Labor Saving And Cost Reducing Equipment

By W. R. BEAN
Vice President
Whiting Corp., Harvey, Ill.

THE year 1940 has witnessed the extended application of previously developed labor saving and cost reducing equipment and the improvement of processes, as exemplified in melting in the gray iron foundry. New arrangements and applications have given improved results with economies in labor and material.

Use of the bessemer converter in production of steel castings has been extended. That advance is of particular significance since the converter which produces relatively small heats, 1 to 2½ tons, delivers those at short intervals, making possible the supplying of continuous metal to mold conveyor lines. Application of the electric eye for control of blow in the converter, constitutes a definite advance in that process.

In conjunction with the bessemer converter, the electric furnace is used as a holding unit. It is only within the past few years that low carbon steel has been supplied to mold conveyors operating continuously for 8 hours or more per day.

Water blast cleaning of large castings in room type equipment has made real progress and the water blast barrel method of cleaning brass and some other types of castings, is showing much promise. Sand reclamation in conjunction with water blast cleaning results in substantial savings in cost of sand per ton of castings produced; the procedure lending itself to thorough washing and classification of sand grain.

Hot blast application to cupola melting has been extended during the year with substantial savings and improvement in metallurgical practice. That offers a most promising field of advance in the foundry industry.

Progress in Technology of Gray Iron Is Being Accelerated Rapidly

By A. C. DENISON
President
Fulton Foundry & Machine Co., Cleveland

ADVANCES in gray iron technology are gradual and it takes an emergency such as the present preparedness program to bring out the significance of the progress that has been made. Furthermore, when progress starts it goes forward for a time at accelerating speed. Such is the case of gray iron.

This accelerating speed of progress in gray iron technology is evidenced by the heavy demand these past few years for foundry equipment of all kinds, including sand conditioning equipment, material handling machinery, melting control equipment, oven control equipment, laboratory and testing equipment, casting cleaning equipment, etc. Then, too, the progress is evidenced by the growing alertness of foundry management to the scientific approach of casting manufacture. This is proven by the larger and larger attendance at technical sessions of foundry organization meetings and conventions. All of which leads to the manufacture of gray iron castings on a better (*Please turn to page* 113)

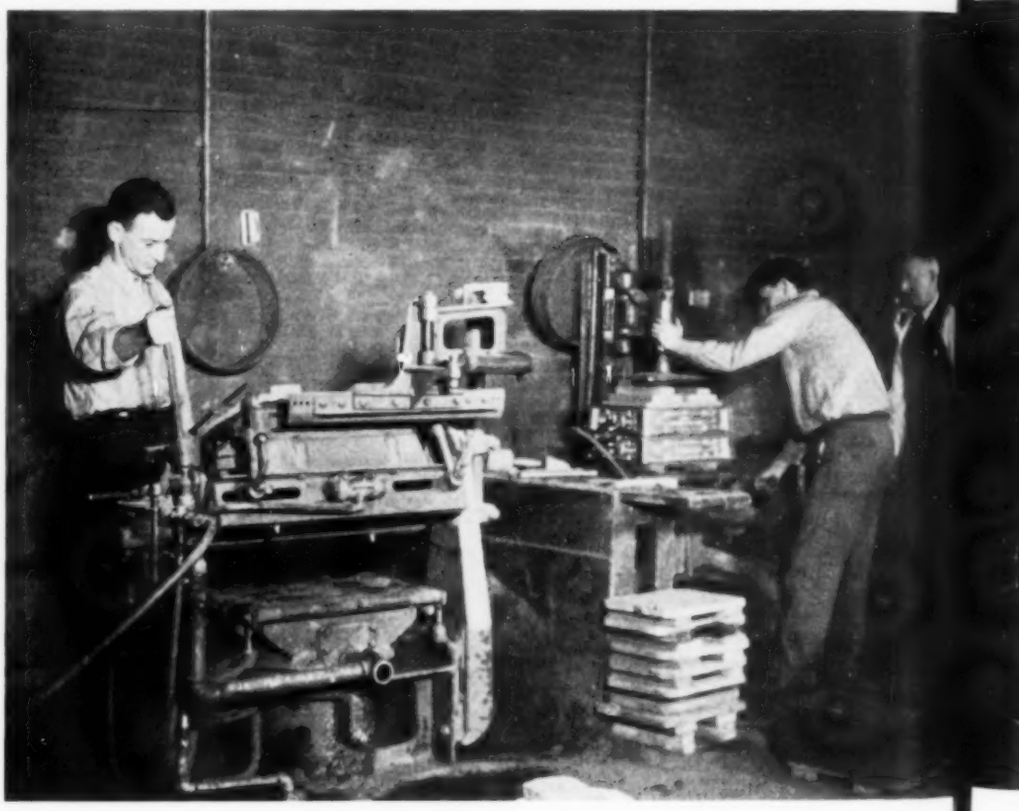
CLEVELAND HAS

National Defense

FOR

LAST summer the Cleveland Board of Education established a national defense training program which included an extensive course designed to provide a supply of semi-skilled workers for foundries in the district. Since July 21, 1940, when the first course was started, two classes have been completed, 62 men have been placed in foundries, and a third class now is in training. The program does not conflict with the apprentice training work which has been carried on successfully for a number of years by the Cleveland Board of Education through the Cleveland Trade school.

The national defense training course for foundries is designed to cover a training period of 300 hours. The course has been developed to give the trainee the most practical and intensive training possible on jobs of commercial standards in iron, steel and nonferrous metals. The theory is limited to those items which are absolutely essential to a functional understanding of the practical work under consideration. The entire course has been designed to prepare the trainee for some job in the foundry in a relatively short period.



View showing part of the molding machine equipment available to students and trainees for instruction in operation

Although the course is set up to cover 300 hours, it has been found possible to train and place some men on certain jobs in a much shorter period of time, for example, operators of plain squeezers and rollover machines, operators on simple core jobs, and operators of grinding machines. On the other hand, 300 hours or even four times that amount is not enough training for certain types of jobs, as for example, bench molding, light floor molding, etc. However, experience has shown that between 300 and 400 hours is sufficient to train a man on a variety of jobs so that he is able to take his place in industry—not as the highly skilled mechanic—but as a learner who has received the fundamental knowledge of the job he will be called upon to perform.

Close supervision and co-operation is required when men thus trained first go on the job in industry. Foremen and management must remember that the most of these men never have been inside a foundry, with the exception of the foundry at the school, and that this represents an entirely new experience.

Colored and white men between the ages of 25 and 35 to be given the special training course are selected from the WPA rolls, with final approval being given by the instructor. The first class of 50 men trained in the Cleveland course were selected by the instructor from a

Training Program

FOUNDRY WORKERS

Close supervision by instructors enables quick grasp of fundamentals. Photos courtesy of Joe Reonigk, Cleveland Trade school

list of 150 recommended by the WPA. Of that class, 43 were placed in foundries, 3 were dropped for various reasons, and 4 found employment in other fields. In the second class of 25 which started Oct. 9, 19 were placed in foundries, 3 were dropped, and 3 were returned to the WPA. The operation of the course is continuous, and as the men reach the point in the training period where they are considered ready for industry, their places are again filled from the ranks of the WPA.

Trainees are given oral tests as training period progresses, and a written test before they are selected for a job. Grades are kept on all work done by the trainee at the school, and this record is sent to the employer when the man is placed to indicate the type of work which has been included in the training course.

The following three important factors must be considered in setting up a successful training course:

(1) Careful selection of the men to be trained.

(2) Proper physical set up ad instructional corps to maintain the training program.

(3) Complete knowledge of the work being done in the foundries into which the trainees will be placed.

Since many requests have been received for detailed information on the foundry course developed at Cleveland, the greater portion of the course of study will be presented in this and succeeding issues of THE FOUNDRY.

Instruction is given on jobs of commercial standards in iron, steel, and nonferrous metals. Practical work covers bench molding, floor molding, machine molding, core making, cleaning, chipping, grinding, inspection. Melting practice, technical instruction and related theory is given on the job as the methods and operations are taught to the trainees. Related instruction as it affects the course is given in the class room. Three types of tests are employed during the training period: Performance, oral, written.

Following shows detail for unit No. 1, bench molding on a plain, flat back casting. The first sentence on each item covers the practice. Second sentence deals with connected theory as imparted by oral instruction. As may be observed the whole procedure is presented with considerable detail to make sure that the student gains a solid knowledge of every step as he proceeds from one opera-

(*Please turn page* 124)

By James G. Goldie

Foundry Instructor
Cleveland Trade School
Cleveland

Questions and Answers

Cast Iron Handwheel Shows Large Hole in Cored Hub

We are sending a handwheel about 11½ inches in diameter which, as you will observe, contains a large hole in the cored hub. Can you tell us whether the hole is a shrink or is caused by a hard core?

While the hole in the hub is adjacent to the core, we do not think that the core is entirely to blame. The hole does not have the appearance of a core blow which usually has a bright, shiny look, but rather seems like that resulting from steam since it appears quite dull. Examination of the arms into which the gates lead indicates that either the sand was too moist in that vicinity or rammed too hard, and the blow in the hub is at the junction of the arms. Possibly the molder used the swab a little too freely around the gates and arms at that point.

Traces Cause of Explosion in Foundry Cupola

Within the past month we had three explosions in a 36-inch cupola. We melt a mixture of 55 per cent No. 1 pig iron and 45 per cent No. 1 cast iron scrap with screened by-product coke no pieces larger than 5 inches and 1 pound flux on each charge. Can you throw any light on the probable cause of the explosions?

Old time foundrymen referring to occasional explosions in the cupola usually had sufficient contemporary evidence to show they were caused by unexploded shells gathered on old Civil war battlefields and either used in some foundry in the vicinity, or shipped elsewhere in carloads of miscellaneous scrap. A few years ago in THE FOUNDRY the late Robert E. Masters described an incident of this kind while he was in charge of the Tredegar Co., plant in Richmond, Va., Other explosions have been traced to pieces of pipe, tanks and water fronts from stoves. Filled with water and sealed either with rust or regular plugs, any one of these, or other castings of a somewhat similar character can be depended upon to explode violently when the liquid inside is converted into steam.

Obviously before an explosion can occur, an explosive material must be present. Pig iron, coke and fluxing material are innocuous. Logic would seem to pin the blame on scrap, or the air. Gas occasionally causes an explosion in the blast pipe or wind box. When the blower for any reason is stopped during a heat, a certain amount of gas leaks into the pipe, especially if the pipe is high, or arranged in a manner that creates a draft toward the blower. The gas mixed with air is highly explosive when restarting of the blower forces it into the cupola.

A gate in the blast pipe should be closed when the blower is idle. It there is no gate, the tuyere doors should be opened to admit air freely.

Sand Draws Down on Long Flat Cope for Iron Girder

Since our supply of Belgian sand was cut off we have experienced some difficulty in developing local sands to meet requirements. We are located in Ireland and use a proprietary clay for a bonding agent. One of the castings in our iron foundry is known as a flyer rail, a flat girder 1½ inches thick, 13½ inches wide and 15 feet in length. The mold is made flat in a shallow flask. Sand in the cope draws down, resulting in severe scabs and dirty castings. We have the A.F.A. apparatus for test and control and will appreciate your comment on the proper type of sand for this job. Specify strength, permeability, moisture content, grain size and any other necessary qualities.

Any fairly open and reasonably refractory sand should stand up satisfactorily on the flyer rail, a long, thin casting 1 x 15 feet and weighing approximately 900 pounds. A sand of that kind will conform approximately to the following A.F.A. standards: Moisture 4 to 6.5 per cent, permeability 80 to 120, green compression 5 to 7.5, dry compression 46, deformation 0.012 to 0.016-inch, clay substance 8 to 13 per cent, fineness number 61 to 50, sintering point 2500 degrees Fahr., green shear 1.1, dry shear 7. Facing sand for the casting will contain approximately 10 per cent coal dust. While the foregoing covers your inquiry in a general way, we should need further detail on a number of variables before presuming on a definite diagnosis of your trouble.

You say "The cope draws downward, resulting in severe scabbing." Since the terms *drawing down* and *scabbing* are not always synonymous, any preventative measures obviously will not meet varying conditions. Scabbing is the term usually applied where small or large areas of surface sand are thrown off, usually by gas or steam pressure. The immediate cause is excess moisture, hard ramming, or excess bonding material. The sand falls from the cope before the mold is filled with metal and therefore may be described as a *draw down*.

However, the term usually is applied to cases where the sand is inherently weak, crumbles and

falls off under the influence of the heat from the rising metal. Close examination of the defect will reveal which cause is responsible and then the proper remedy may be applied. We are inclined to the opinion that the second cause is responsible. If the sand would scab on the cope face, it would also scab on the drag face. To minimize exposure of cope face to high temperature, the metal should be poured as rapidly as possible through gates at each end, three branches to each gate. Temporary relief until a suitable sand is developed may be secured by spraying or painting the cope with molasses (treacle) water blacking and giving it a slight skin drying.

Small Iron Castings Are Hard To Machine on Thin Edges

We operate a foundry in Canada, and the thin edges of some of our small castings are unmachinable unless we incorporate from 25 to 30 per cent high silicon pig iron in the cupola charge. This iron has a silicon content of 3.75 per cent, sulphur 0.02 per cent, phosphorus 0.59 per cent, manganese 0.82 per cent, total carbon 3.54 per cent. The remainder of the charge is made up of 25 to 30 per cent machinery scrap and 40 to 50 per cent return scrap. After adding 1½ ounces 92 per cent graphite to a 35-pound ladle of iron the castings show an approximate analysis: Silicon 2.58 per cent; sulphur 0.09 per cent, manganese 0.45 per cent, phosphorus 0.82 per cent, graphitic carbon 2.79 per cent and total carbon 3.25 per cent. Under present conditions we have difficulty in securing pig iron. We shall appreciate information that will permit us to use greater amounts of scrap.

With due allowance for several other factors involved in the production of iron castings, silicon is the main graphitizing element or the element which determines the amount of combined and free carbon in the iron while it is cooling in the mold. In ordinary shop parlance the relative amounts of combined and free or graphitic carbon determine the hardness of the metal. Your problem resolves itself into providing an alternative material for the comparatively high silicon derived from the pig iron. Have you considered the use of silvery pig iron containing 7 per cent or more silicon? While you mention pig iron is hard to get, that type of iron might be available, and you would not use much in each charge.

Ferrosilicon and nickel are other materials usually employed to eliminate trouble such as you encounter. The former in bulk or in briquets generally is incorporated in the cupola charge, but in many instances in powdered form, it is added to the stream of iron in the cupola spout. Nickel added to the charge or in the spout to the extent of about 1 per cent will increase machinability and eliminate hard edges. Your present practice of adding a small amount of graphite also is commendable, but to obtain full benefit of such addition, the iron must be hot. Your molding sand may be partly responsible. The sand should be worked as dry as possible. Extra dampness in the sand chills the iron to a greater extent than sand with less moisture. Chilled edges can be made machinable by heating the castings to 1000 degrees Fahr. and cooling slowly.

Wants Data Upon Composition For Lathe Tail Stocks

We are urgently in need for a formula for gray iron to be used in casting lathe tail-stock turrets. Can you give us any suggestions?

Practically all machine tool parts at present are made from alloy irons and that material is suggested for the application you mention. As may be expected a number of compositions are being used successfully, and the selection of any specific composition must include consideration of the melting and molding practices employed in your own particular case. In general the alloying agents used include nickel, molybdenum and chromium either alone, except in the case of chromium, or in various combinations.

For example an alloy iron containing about 1.25 per cent silicon, 0.90 per cent manganese, 0.35 per cent molybdenum and 3.25 per cent total carbon may serve. Another iron may contain about 1.20 per cent silicon, 0.85 per cent manganese, 1.75 per cent nickel, and 3.00 per cent total carbon. An iron similar to the latter contains 1.00 per cent silicon, 0.85 per cent manganese, 1.75 per cent nickel and 0.30 per cent chromium.

Shrinkage Holes in Cast Iron Bushings Cause Trouble

We are making cast iron bushings 8 inches in diameter, 9 inches long with a 3-inch wall, cast on end, and are having trouble with shrinkage holes on the side opposite the pouring gate. We have tried gating in various ways, top and bottom; used side and top risers; churned with a top riser; tried pop gates, etc. without success. The castings look satisfactory in the rough but machining reveals the holes under the skin on the interior cored hole. We use 50 and 60 per cent mixtures of good heavy machinery scrap and pig iron, and have tried as much as 20 per cent steel scrap with the same results.

Making bushings of the type you describe should be, in the vernacular, as easy as rolling off a log since they are comparatively plain castings of uniform cross section. However, the fact that difficulties are encountered with such types of castings is not unknown, and often the remedy is not easy to find. That is amply indicated by your own experience in trying the logical remedies of different gating procedures and changing the metal composition.

Since those have been tried without success only one possible reason appears to be left. We are assuming that the core is not a cause since a blow would show on the surface adjacent although sometimes it is quite difficult to see just where the gas penetrated the skin of the metal. The possible reason we had in mind is lack of rigidity at or near the bottom of the mold which permits a swell due to the sand giving away. You can see readily that only a slight give or expansion of the mold could create a considerable void in the interior of the casting. The remedy for that condition is ramming somewhat harder to stiffen the sand, but not so much so that the mold becomes hard enough to blow.

Calculate Size of Driving Pulley

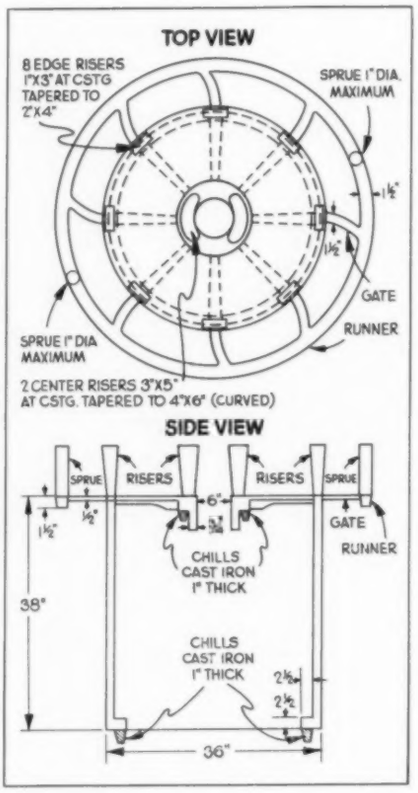
We shall appreciate information on how to calculate the required speed of a pulley 22 inches diameter on a positive pressure blower supplying blast to a cupola lined to 30 inches diameter.

A cupola lined to 30 inches inside diameter has a melting capacity of approximately 7000 pounds of iron per hour. This requires delivery of 1700 cubic feet of air per minute from the blower. Your problem resolves itself into dividing the volume of air per minute, by the volume delivered per revolution and the result is the number of revolutions per minute for the blower and, of course, also of the pulley, irrespective of size. For example assuming that the blower delivers 100 cubic feet per revolution. Divide 1700 by 100 and the resulting figure 17 represents the number of revolutions required of the blower. However, under modern conditions it is not necessary to work out any of the problems connected with the driving equipment of a blower. All blower manufacturers have data on the subject and will be glad to supply information either of a general or specific character.

Gate Aluminum Drum For Soundness

We would like information relative to gating a fairly large aluminum casting to be made in No. 12 alloy. The casting is a straight-side drum or barrel to be cast on end in green sand without any dry sand core. One end of the drum is closed, with the exception of a 6-inch opening through a hub in the center. The other end is open with the exception of a 2-inch flange around the inside end of the drum. It is 36 inches in diameter, 38 inches high and ⅝-inch wall. Flange inside bottom edge is 2 x 2 inches, top end is ½-inch thick with 8 ribs running from outer edge to 11-inch center hub. Hub cross section at inner end of ribs is 2½ x 2½ inches with ring extension above of 3 inches height with ¾-inch wall. What temperature is suggested to get a sound casting to be machined all over exterior? We have made larger and heavier castings, but have had some difficulty in obtaining a solid structure.

Your remarks relative to difficulty in securing a solid structure in your heavy castings evidently is attributable to lack of feeding and excessive agitation of the metal in the mold during pouring. Therefore, it is suggested that you examine carefully your methods of gating and risering future castings. With reference to the present drum casting, we are enclosing a sketch showing a suggested procedure. You will observe what might be considered an excessive amount of metal in gates and risers, but, in our opinion this is the simplest procedure for insuring a sound casting. It is quite possible that due to the long drop of the metal (38 inches) it may be advisable to extend the gating system still further by having



A large number of risers are required to insure adequate feeding, and it may be necessary to extend the gating system to feed from the bottom and about half-way up

the metal enter at the bottom and about half way up in addition to the top gates.

Additional gates may be incorporated by use of ram-up gating cores or by use of a 4-part flask with a preference for the latter method. Using a 4-part flask consisting of drag, cheek in two parts, and cope, identical systems of gates and runners of the type shown in the attached sketch should be located in the drag and between the cheeks as well as in the top of the cheek. That will give three points of entry for the molten metal which fill the cavity in succession, beginning at the bottom. Top gates and risers will be the last to fill, and of course will contain the hottest metal which is necessary for adequate feeding.

You also will note that two cast iron chills are indicated at the heavier sections of the flange at the bottom, and the hub at the top. Those should promote the same rate of cooling as in the lighter sections of wall and top. Although we would not recommend chilling of the vertical side walls at first, use of such chilling might be found necessary to minimize pinhole porosity. A pouring temperature of 1350 degrees Fahr. should be suitable for the casting, using the single or triple gating system, but it is possible that a lower pouring temperature would be satisfactory.

It will be necessary for you to do a little experimental work to determine the most suitable temperature for pouring the casting.

While you may not welcome our suggested gating system due to the higher production cost resulting from high pouring ratio, additional molding time and added trimming cost, we do not know of any more economical method of gating which will produce a quality casting with a dense structure.

Desires To Produce White Cast Iron

Can you give us any information on the most economical way of making white cast iron without any chill?

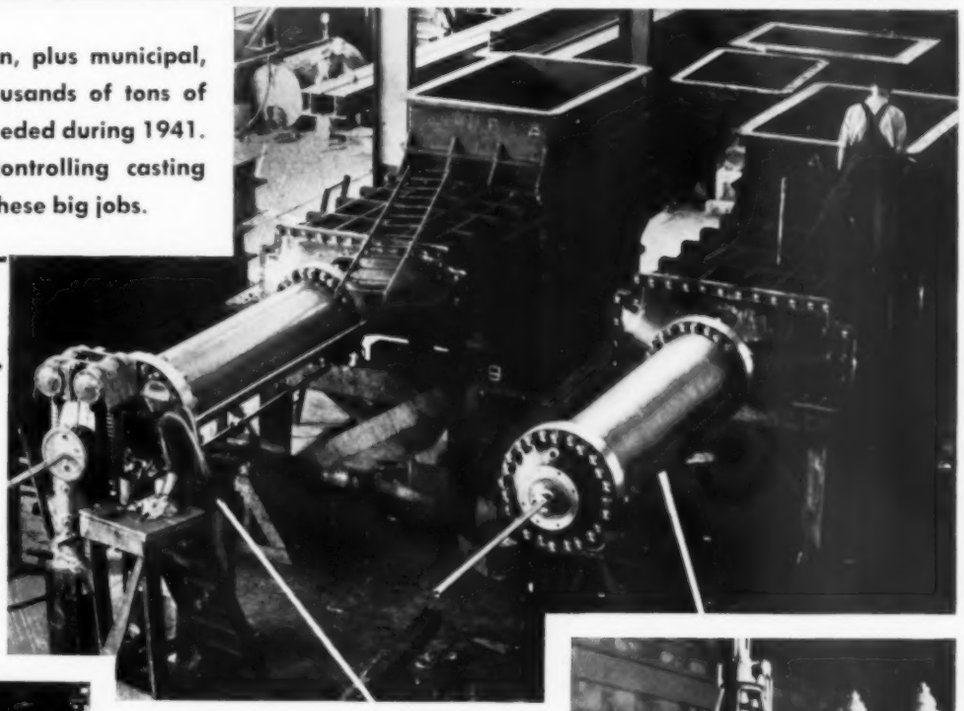
Cast iron with a white fracture throughout can be made by melting down raw materials low in silicon content such as low silicon pig iron, steel scrap, etc., and the reduction in silicon content will depend upon the thickness in section. That is to say the thicker the section, the lower the silicon content. However, such white iron usually is rather brittle and fragile, and chilled iron or white iron made through addition of carbide stabilizing, alloying elements are preferred because they possess toughness.

Alloying elements which promote chill include chromium, vanadium and molybdenum, and while they may be used singly, more beneficial effects are obtained by using various combinations such as 4 to 6 per cent nickel and 2 per cent chromium for a white iron. Further improvement may be obtained by addition of 0.25 to 0.35 per cent molybdenum or 0.35 per cent vanadium. A combination of copper and chromium may be employed in a chilled iron in the range of say 1.5 per cent copper and 0.5 per cent chromium to obtain a better structure in the chilled portion. Concentrations as low as 0.50 per cent molybdenum with 0.20 per cent chromium in chilled iron result in a marked change in the coarseness of the chill. Addition of 0.75 per cent molybdenum with 0.20 per cent chromium produces a chill with a silky fracture and a fine mottle.

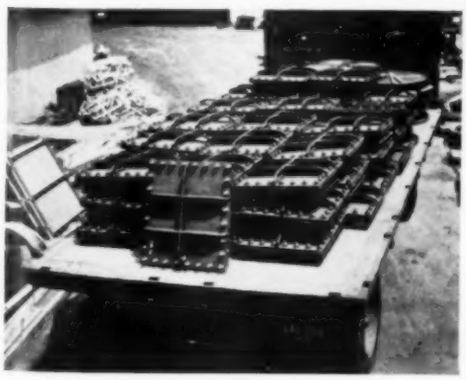
attractive **TONNAGE** *in water supply projects*

...following specifications for high-strength **NICKEL CAST IRONS**

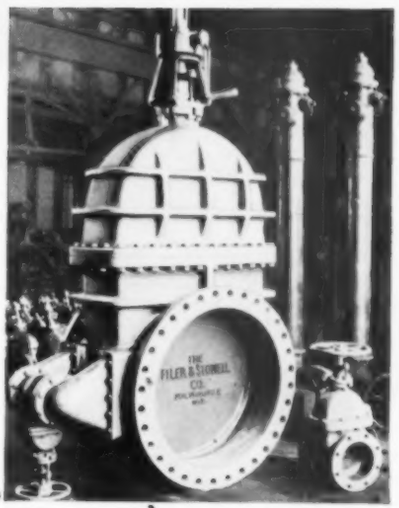
With rapid industrial expansion, plus municipal, state and federal projects; thousands of tons of high test iron castings will be needed during 1941. Modern foundries, carefully controlling casting qualities, can bid profitably on these big jobs.



60,000 P.S.I. Exceeding A.S.T.M. "Class 60" specification A-48-36, the MADSEN IRON WORKS, Huntington Park, Calif., cast 8 gate hanger cylinders for the Hansen Dam. Two heats of this 1.50% Nickel, 0.50% molybdenum composition showed 60,900 and 66,600 p.s.i. tensile strengths.



40,000 P.S.I. Nearly seven tons of frames and covers for a water softening and filtration plant were cast in a Nickel alloy iron by the ALHAMBRA FOUNDRY CO., Alhambra, Calif. To exceed A.S.T.M. "Class 40" specifications for a tough, moderately corrosion-resistant iron this composition was used: Total carbon, 3.02%, Silicon, 2.16%, Nickel, 2.65%, Chromium, 0.62%. Tensile strengths tested above 41,000 p.s.i.



50,000 P.S.I. Subjected to tests at double the specified pressure, these 8" and 36" gate valves for the Loyalhanna Creek Dam showed no signs of strain. These pressure-tight castings were produced, with less than normal rejects, in 50,000 p.s.i. alloy iron by FILER & STOWELL CO., Milwaukee. Composition was: Total carbon, 3.00% (max), Silicon, 2.50% (max), Nickel, 1.25% (min), Chromium, 0.25% (min), Molybdenum, 0.25% (min).

Complete information on production of high strength, pressure tight Nickel alloyed iron castings will be sent promptly upon your request. Please address:

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

MEN of INDUSTRY

HENRY C. WINTE, formerly foundry metallurgist, Fairbanks, Morse & Co., Beloit, Wis., has been made works metallurgist, Worthington Pump & Machinery Corp., Buffalo. Mr. Winte graduated from Michigan State college as a mechanical engineer in 1931. His first foundry connection was with the Saginaw Malleable Iron Co., Saginaw, Mich., as melting foreman. Following that, he held a similar position with Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., for 1 year, and in 1936 joined the Fairbanks Morse company. Mr. Winte served as technical secretary of the Northern Illinois-Southern Wisconsin Chapter of the A. F. A. from 1937 to 1940 and in 1940 was elected vice chairman.

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LEROY E. EVERETT, formerly connected with the Key Co., East St. Louis, Ill., has resigned to become foundry superintendent, the Kaukauna Machine Corp., Kaukauna, Wis. That company has a capacity of about 350 tons per month, and Mr. Everett will redesign, equip and organize it for an expected capacity of approximately 2000 tons per month. Mr. Everett was born in 1898 and attended the University of Wisconsin. He started his foundry career in 1921 in the Indiana Harbor works of the American Steel Foundries as a special apprentice. In 1925 he became connected with the Nugent Steel Castings Co., Chicago, as research engineer, and 2 years later was appointed foundry engineer of the Illinois Clay Products Co. In 1931 he was made superintendent of the steel foundry of the Stockham Pipe Fittings Co., Birmingham. Two years later he went to Los Angeles as superintendent of the Warman Steel Castings Co., and in 1934 returned to the Stockham company in the same capacity. He joined the Key Co. in 1937. Mr. Everett has been active in the work of the St. Louis chapter, and recently completed his term as president of that organization.

♦ ♦ ♦

C. EUGENE SILVER, recently was made works manager, Michigan Steel Casting Co., Detroit. Mr. Silver became connected with the iron and steel industry in 1916 at the Milwaukee works of the Illinois Steel Co. where he started as sample boy and progressed to the position of assistant chief chemist. During the war he saw military service in the United States army as a cadet and lieutenant, aerial observer, air corps. In 1923 he was graduated with a bachelor of science degree in mechanical engineering from the University of Wisconsin, Madison, and later obtained a master of science degree in metallurgy from that university. Upon finishing his education he became associated with the Sivyer Steel Casting Co., Milwaukee, as a student foundryman. After 1 year's training he was made foreman of the bench and squeeze department and the floor department. Later he was made research engineer on foundry problems, cleaning room foreman, general foreman and assistant superintendent. In 1937 Mr. Silver became superintendent and later works manager at the Smith Steel Foundry Co., Milwaukee. In 1940 he was director of the Milwaukee chapter of the A.S.M. He also is a member of the A.F.A. and has been active on the apprenticeship committee and the regional conference committee, having served as chairman of the steel casting group.

♦ ♦ ♦

RUDOLPH E. WILKE, formerly foundry metallurgist, John Deere Tractor Co., Waterloo, Iowa, has been made metallurgist of the Deere & Co. testing and research laboratories, Moline, Ill. Mr. Wilke was graduated from the State University of Iowa in 1928 and was chemist

(*Continued on page* 54)

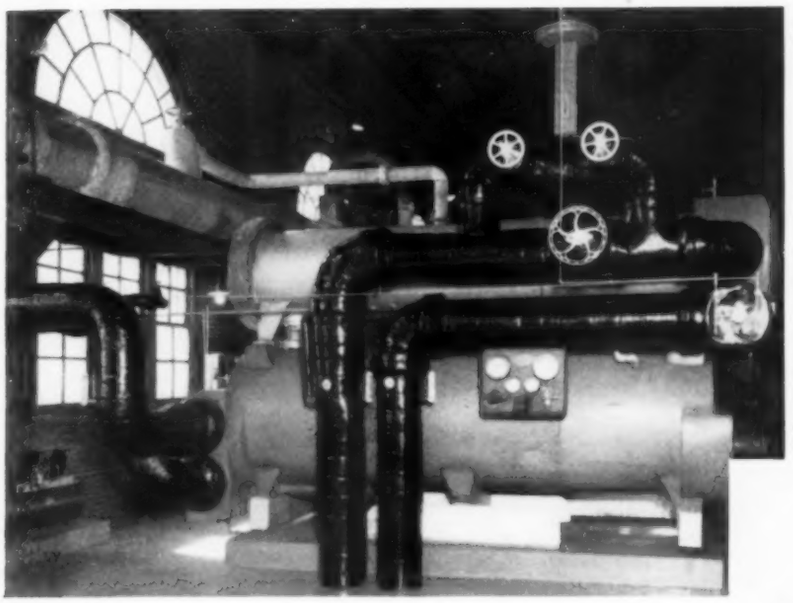
Henry C. Winte

Leroy E. Everett

C. Eugene Silver

Rudolph E. Wilke

COMPLETE *Air-Conditioning* Of All WOODWARD Furnaces



assures our customers
STILL GREATER UNIFORMITY IN WOODWARD IRON

SO successful were initial installations of air-conditioning equipment at Woodward in bringing to a still higher standard the uniformity for which Woodward iron is so favorably known to the foundry trade that we have now air-conditioned *all* our furnaces.

Woodward was the first iron producer in the world to adapt modern air-conditioning to the reduction and control of moisture in the air blast. Not only has this epoch making innovation improved the quality of our merchant output but it has also increased production of our air-conditioned furnaces.

If you are making castings which must meet precise standards, order Woodward iron. You'll find it meets your most exacting requirements.

WOODWARD IRON COMPANY

Woodward, Alabama

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

INDEPENDENT SINCE 1883

(*Continued from page* 52)

for the Chicago Malleable Castings Co., Chicago, for 7 years before he joined the staff of the John Deere Tractor Co.

♦ ♦ ♦

CHARLES O. BUTLER, superintendent, Warren Pipe Co. of Massachusetts, Inc., Everett, Mass., recently was elected president of the New England Foundrymen's association. Mr. Butler was born in Warren county, N. J., and completed his elementary education at the Belvidere, N. J. high school. He attended Lafayette college, Easton, Pa. as a student in mechanical engineering, but left to accept a position in the engineering department of the Ingersoll-Rand Co., Phillipsburg, N. J., where he served for 1 year and then transferred to the Treadwell Engineering Co., Easton, Pa. Continuing as a mechanical draftsman he entered the service of the Warren Foundry & Machine Co., Phillipsburg, N. J. in 1921. A year later he was transferred to the inspection department of that company and later became chief inspector. In 1929 the company, then organized under the name of the Warren Foundry & Pipe Corp., constructed a new centrifugal cast iron pipe plant at Everett, Mass. and Mr. Butler was appointed superintendent.

♦ ♦ ♦

E. H. MEBS recently resigned as metallurgist, Ohio Steel Foundry Co., Lima, O., to become connected with the United States Steel Corp.

♦ ♦ ♦

A. C. ZIEBELL, president, Universal Foundry Co., Oshkosh, Wis., and vice president of the Wisconsin chapter of the A.F.A., recently has been elected president of the chamber of commerce of that city. He served previously as vice president.

♦ ♦ ♦

GEORGE N. JEPPSON has been elected president, Norton Co., Worcester, Mass., succeeding ALDUS C. HIGGINS, who was appointed chairman of the board, filling the position left vacant by the death of Charles L. Allen. Mr. Jeppson joined the Norton Co. in 1892, and after being assistant superintendent and works manager was chosen a director in 1906. In 1919 he was appointed secretary and in 1933 became treasurer. He has been a vice president several years. Mr. Higgins became connected with the Norton Co. in 1900 and managed the abrasive plants before he was elected secretary in 1912 and treasurer and general counsel in 1919. He has been president of the Norton company since 1933.

♦ ♦ ♦

L. D. REED has been placed in charge of the Philadelphia district sales office of the Whiting Corp., recently opened at room 838, Broad Street Station building. The Philadelphia sales office territory comprises eastern Pennsylvania, southern New Jersey, Delaware and the greater portion of Maryland. Mr. Reed has been connected with the Whiting Corp. for 26 years, both as an engineer and for the past 19 years as a salesman.

♦ ♦ ♦

JOHN H. MORSE, senior vice president for 13 years, Buchen Co., Chicago, industrial advertising agency, has been appointed chief of the newly formed division of commercial and economic information, bureau of foreign and domestic commerce, Washington.

♦ ♦ ♦

HENRY S. EVANS recently was elected president and chief executive officer, Central Iron & Steel Co., Harrisburg, Pa. BASIL M. GRAHAM was elected vice president, continuing in the offices of secretary and treasurer.

♦ ♦ ♦

ASHLAND HENDERSON, chemical engineer, has been appointed to the technical staff of Battelle Memorial institute, Columbus, O. He has been assigned to a research investigation which is aimed at the development of metal surfaces resistant to wear, corrosion, and chemical attack for specialized industrial uses. Mr. Henderson formerly was metallurgist, Frigidaire division, General Motors Corp. He received a master's degree from the University of Cincinnati, and is a member of the American Society for Metals.

♦ ♦ ♦

GEORGE W. MATTHEWS JR. has been appointed manager of the metropolitan New York bulk products sales office, Corn Products Sales Co., succeeding the late C. C. Van Buskirk.

♦ ♦ ♦

KENNETH ODE, personnel manager, the Falk Corp., Milwaukee, and associated with the corporation since 1934, has been appointed supervisor of plant maintenance, succeeding A. D. REA.

♦ ♦ ♦

R. H. HATHAWAY, formerly sales engineer, Production Machinery Co., Greenfield, Mass., has been made assistant to chief engineer, HENRY J. KINGSBURY, Hammond Machinery Builders Inc., Kalamazoo, Mich.

♦ ♦ ♦

H. T. WORTHINGTON has been appointed New York district sales manager, Shaw-Box Crane & Hoist division, Manning, Maxwell & Moore Inc., Muskegon, Mich., with headquarters in the Chrysler building, New York.

♦ ♦ ♦

JOHN M. SCOTT has been appointed manager of industrial sales, Republic Coal & Coke Co., Chicago. He formerly was associated with Walter Bledsoe & Co., Chicago, coal wholesaler.

♦ ♦ ♦

CHARLES H. HOEFER, formerly superintendent of the alloy division, Lebanon Steel Foundry, Lebanon, Pa., recently was made general superintendent, the Duralloy Co., Scottdale, Pa. Mr. Hoefer has been connected with the steel and alloy steel casting division of the foundry industry since he began serving his apprenticeship in 1910 and has held posi-

(*Continued on page* 56)

Charles O. Butler

George N. Jeppson

Aldus C. Higgins

L. D. Reed

Heat checking usually causes failure of cast iron brake drums on buses—trucks—airplanes—railway equipment. Meeting the situation by raising the total carbon is often incompatible with the strength requirements.

Adding about 0.50% Molybdenum permits both a higher total carbon and the required strength. Chromium and vanadium additions help improve the high temperature strength.

Write for technical book "Molybdenum in Cast Iron" for details on brake drum irons and other Molybdenum irons and their applications.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS. MOLYBDIC OXIDE BRIQUETTES FOR THE CUPOLA—FERROMOLYBDENUM FOR THE LADLE

Climax Molybdenum Company
500 Fifth Avenue New York City

MOLY

Honor S. C. Vessy on 75th Birthday

A HANDSOME scroll, signed individually by some 40 of his closest associates, was presented S. C. Vessy, president, W. W. Sly Mfg. Co., Cleveland, in recognition of his 75th birthday on Feb. 3.

"Congratulations and best wishes from your friends to our friend," was the spirit expressed in keeping with the feeling of everyone toward Mr. Vessy, who as president of the company for the past 20 years, has ably guided the business and brought it forward.

An attorney by training, Mr. Vessy practiced in Cleveland in his early days. He was delegate to the Republican convention that nominated William McKinley at St. Louis in 1896. Mr. Vessy is a past director of the American Foundrymen's association, a past president of the Foundry Equipment Manufacturers' association, and has been prominent in furthering numerous civic enterprises.

(*Continued from page* 54)

tions of a supervisory nature since 1915. His first foundry connection, including apprenticeship, was with the Joyce-Cridland Co., Dayton, O. Since 1919 Mr. Hoefer has been connected in the capacity of superintendent with a number of foundries including: Forging & Casting Corp. division of Ludlum Steel Corp., Ferndale, Mich.; Eastern Steel Castings Co., Newark, N. J.; Empire Steel Castings, Inc., Reading, Pa.; and Lebanon Steel Foundry, Lebanon, Pa.

♦ ♦ ♦

GEORGE A. MURPHY JR. recently was appointed to the industrial sales division of the American Steel Foundries, with headquarters at East Chicago, Ind. Mr. Murphy was educated in Cincinnati and acquired his foundry experience under the direction of Dr. Fahrenwald of the Fahralloy Co., Harvey, Ill.

♦ ♦ ♦

FRANCIS C. MORAN, 315 Grosse Pointe boulevard, Detroit, has been appointed district manager for southern Michigan and northwestern Ohio, for Reznor Mfg. Co., Mercer, Pa., manufacturers of gas fired unit heaters and domestic furnaces. CHESTER MCCLINTOCK, Milan, Tenn., has been appointed district manager for the Tennessee territory of the company.

♦ ♦ ♦

GEORGE B. KUTZ, recently was appointed district sales manager for the Southeastern territory of Wright Mfg. division, American Chain & Cable Co. Inc., York, Pa. Mr. Kutz has been associated with American Chain & Cable company many years. He will make his headquarters in Atlanta, Ga.

♦ ♦ ♦

JAY J. SEAVER has become associated with Day & Zimmerman Inc., Philadelphia. Mr. Seaver is a graduate of the University of Michigan and formerly was associated with Arthur G. McKee & Co., Cleveland, as vice president and more recently with H. A. Brassert & Co., Pittsburgh as vice president. While with the McKee company, Mr. Seaver also served as president of the Pulaski Foundry & Mfg. Corp., Pulaski, Va.

♦ ♦ ♦

WILLIAM E. WRIGHT, formerly connected with the Austin-Western Co., and for the past 3 years engaged in equipment business in Wisconsin, recently was appointed sales manager of the Diamond Iron Works Inc., Minneapolis. FRANK P. BLANCETT has been transferred as district representative from the Southwest territory to the East Central territory.

♦ ♦ ♦

CHARLES B. BOHN, chairman, Bohn Brass & Aluminum Co., Detroit, has been elected president, Aluminum association at its annual meeting in New York. WILLIAM G. GOLDEN, vice president, Reynolds Metals Co., Louisville, Ky. was named eastern vice president; HAROLD B. HARVEY, president Harvey Metal Corp., Chicago, western vice president; and ARTHUR V. DAVIS, Aluminum Co. of America, New York, chairman of the board of directors. KENNETH G. CASTLEMAN, New York, continues as secretary.

♦ ♦ ♦

RICHARD A. FLINN recently was made a member of the staff of the metallurgical department, American Brake Shoe & Foundry Co., Mahwah, N. J. Mr. Flinn was born May 31, 1916. He received the degree of bachelor of science in chemical engineering from the College of the City of New York in 1936, and a year later was granted the degree of master of science in metallurgy by Massachusetts Institute of Technology, Cambridge, Mass. His thesis for the latter degree was: "Effect of Age Hardening on Damping Capacity of Metals." From 1937 to 1939 he was metallurgist, International Nickel Co. in field and laboratory development of high strength cast iron, and the following year he was a member of the staff of the department of metallurgy, Massachusetts Institute of Technology. Earlier this year he completed his thesis for the degree of doctor of science on, "The Nature, Production and Control of High Strength Acicular Structures in Gray Cast Iron."

♦ ♦ ♦

OWEN KLINE recently has been appointed district representative,

(*Concluded on page* 58)

Speed up PRODUCTION WITH TRULINE BINDER

REG. U. S. PAT. OFF.

Get more cores and more sound, clean castings

WITH THIS LOW-COST BINDER

Truline Binder comes to you as a uniformly pulverized powder, in clean convenient-sized paper bags, easy to handle. It mixes readily with green, dry, or reclaimed sand. The core-sand mix has low green strength, rams quickly, allows you to turn out *more cores per hour.*

Interested? Read on . . .

● Truline Binder bakes quickly to a strong bond, because it fuses and hardens and does not require air to develop bond. You get good cores, with excellent dry strength, that stand up to the action of hot metal with minimum cutting and washing. And, incidentally, you can often use high proportions of reclaimed sand. The real meat here is that *baking times are sharply cut.*

That's not all . . .

● Truline Binder loses its bond, sharply, above 650°F. Thus, cores collapse and disintegrate as the heat of the casting gets into them. The result is easy knockout and a big reduction in cleaning time. Thus, you can *more much faster on the cleaning floor.*

● The final touch of speed is gained because, with Truline-bonded cores that collapse in time, your castings can shrink freely. Rejects due to shrinkage-cracks are held to a minimum, *further increasing your production.*

Truline Binder is doing these things for others right now.

Any or all of these benefits may be realizable in your own foundry operations. If you're interested in more good cores and castings per man-hour from your present equipment, write for full information and a trial amount. Or better still, ask us to demonstrate Truline Binder—the new-type bonding agent—right in your own plant.

USE THE HANDY COUPON

HERCULES POWDER COMPANY
INCORPORATED
999 Market Street, Wilmington, Delaware

Please send information about Truline Binder. ☐
Please send a free trial sample. ☐

Name _____ Street _____

Company _____ State _____

City _____

JJ-36

NAVAL STORES DEPARTMENT
HERCULES POWDER COMPANY
Incorporated
WILMINGTON, DELAWARE

BRANCH OFFICES: NEW YORK • CHICAGO • ST. LOUIS • SAN FRANCISCO • SALT LAKE CITY

(*Concluded from page* 56)

Riehle Testing Machine division, American Machine & Metals Co., East Moline, Ill., with offices at 63 West Milwaukee avenue, Detroit. Mr. Kline has been engaged in engineering sales work for that company during the past 5 years.

• • •

ERNEST F. HESS, metallurgical engineer, Ohio Injector Co., Wadsworth, O., recently was elected councilman-at-large of that city.

• • •

W. HARVEY PAYNE, president and general manager of the newly formed Hydro-Arc Furnace Corp., Chicago, long has been identified with the electric furnace field. He started his career in 1914 with the Pittsburgh Electric Furnace Corp., Pittsburgh, and later attended the Carnegie Institute of Technology where he was graduated in 1917. He then joined the General Steel Co., Milwaukee, as plant engineer. When the plant was discontinued at the close of the first World war, he returned to the Pittsburgh Furnace Corp. Later he was associated with the Jessop Steel Co., Washington, Pa., and the Clairton works of U. S. Steel Corp. Mr. Payne then became associated with the Pittsburgh Lectromelt Furnace Corp., Pittsburgh, and remained with that firm until he severed his connection in 1939 to form his own organization.

• • •

JOHN V. OLLE recently has been appointed superintendent of plant No. 2, Motor Castings Co., Milwaukee. Mr. Olle received a degree of chemical engineer from Marquette university in 1927 and served as a co-operative apprentice at Allis-Chalmers Mfg. Co., Milwaukee. After graduation, Mr. Olle worked for the Nash Motor Co., Kenosha, Wis. on sand control, leaving there January, 1930 to become connected with Motor Castings Co. as metallurgist. He continued in that position until October 1939 when he became plant metallurgist for the Chicago Hardware Foundry Co., North Chicago, Ill. He returned to the Motor Casting Co. as superintendent of plant No. 2 in January, 1941 where he is working under FRANK M. KULKA, general superintendent of both plants of that company. Mr. Olle is a member of the A. F. A.

• • •

GEORGE E. CLARK, formerly foundry service engineer, Steel Sales Corp., Detroit, has joined the research department of the Cummins

George E. Clark

Engine Co., Columbus, Ind. Mr. Clark graduated from the University of Detroit in 1933, with a degree in metallurgical engineering, and then became electric furnace melter with the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. In 1934 he resigned to become metallurgist, Ecorse Foundry Co., Ecorse, Mich. A year later when the Kelsey-Hayes Wheel Corp. built its new plant, he was made shift superintendent in the melting department of that organization, later resigning to do sales promotion work for the Steel Sales Corp. He is a member of the American Foundrymen's association, and the American Society for Metals.

• • •

J. W. GARDNER, chairman, Gardner-Denver Co., Quincy, Ill., recently was presented with a tiny gold, diamond set model of a steam governor by his associates as a symbol of his 60 years of service with the company. That company was founded in 1854 by Mr. Gardner's father, the late Robert W. Gardner. Mr. Gardner first joined the company as a boy of 17, starting as an apprentice machinist. His services include nearly 30 years as president, and, in more recent years, as chairman of the executive committee.

Book Review

Sabotage, How To Guard Against It, by Harry D. Farren; cloth, 56 pages 5¼ x 8 inches; published by National Foremen's institute, Inc., Deep River, Conn., for $1.00.

This book was written to inform the workers of the nation of the serious dangers that confront them and to make them aware and alert. The first chapter opens with a graphic description of the explosion which wrecked the Hercules Powder Co., plant at Kenvil, N. J., Sept. 12, 1940, followed by an equally graphic reference to the incident July 31, 1916 when a dozen barges were blown up at Black Tom island, Jersey City. In both instances the premises were guarded vigilantly by sailors, soldiers, watchmen, private detectives, government agents and local police. The report covers briefly several other cases of sabotage. The book concludes with extracts from information recently released by the War Department in regard to buildings, their erection and use.

McClave Co., recently purchased patterns, drawings, goodwill, etc., of the McClave-Brooks Co., Scranton, Pa., and has moved the company to Allentown, Pa. The company has built a new plant on Mill street which includes the engineering department, and a shop to fabricate and machine stokers and grates made by that organization. The company has been producing McClave stokers and grates for over 58 years. R. B. McClave is president.

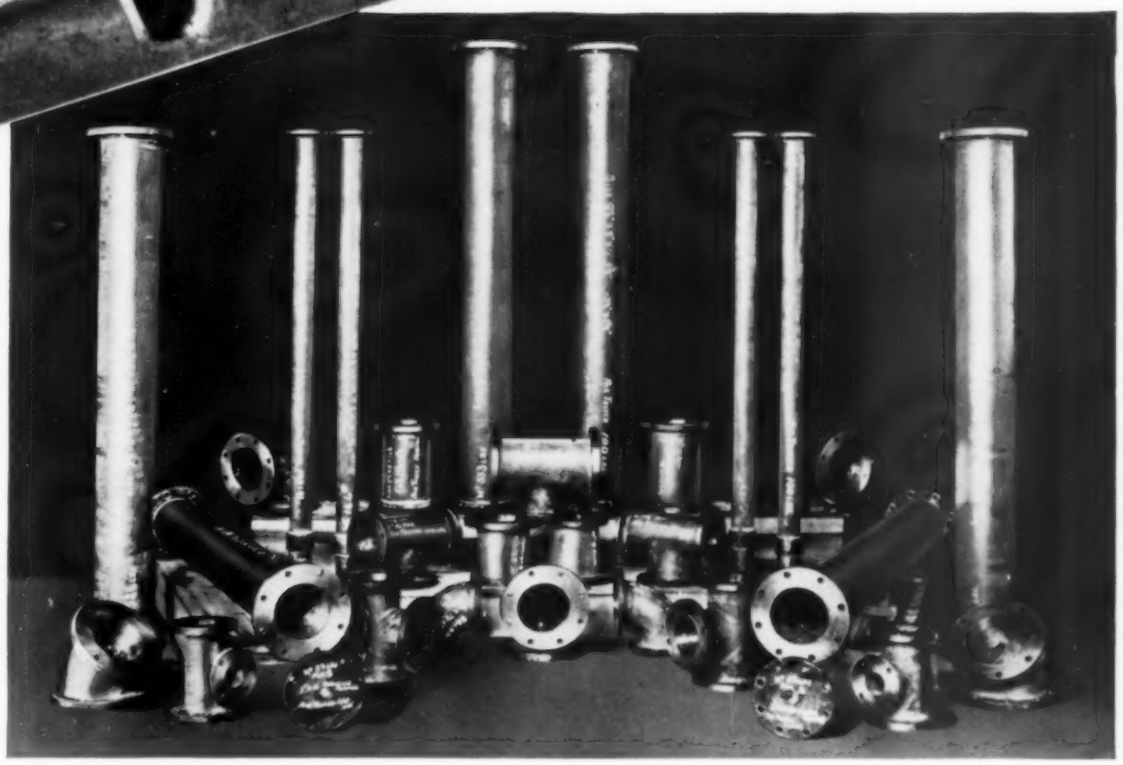
W. Harvey Payne

John V. Olle

J. W. Gardner

From Everdur Copper-Silicon Alloy...

High strength, thin section castings like these



EVERDUR*, a development of metallurgical research in the field of engineering, has been successfully used over a fifteen-year period for the production of strong, sound castings. The advantages of this moderately priced copper-silicon alloy include excellent corrosion-resistance, good machining qualities, and general ease of handling in the foundry.

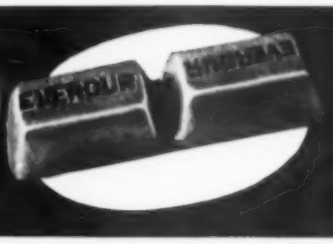
Everdur is furnished ready for use in 25-pound notched ingots and can be melted and cast by regular brass and bronze foundry equipment.

Be sure you're not missing a good bet. Find out about the excellent casting qualities of Everdur, and the physical properties of the castings you can produce with it. Anaconda Publication E-1 covers the subject completely. Simply write and ask us for a copy—no obligation whatsoever.

41182

ANACONDA

Everdur Casting Ingots



THE AMERICAN BRASS COMPANY, General Offices: Waterbury, Connecticut

In Canada: Anaconda American Brass Ltd., New Toronto, Ont. • Subsidiary of Anaconda Copper Mining Company

*EVERDUR IS A TRADEMARK OF THE AMERICAN BRASS COMPANY, REGISTERED IN THE UNITED STATES PATENT OFFICE

THE ADVENTURES OF BILL

By PAT DWYER

Drawings By RICHEY

I SAW a picture today," Bill said, "in one of these book, card and gift places, a picture that reminded me of a bum we picked up last summer on the road near Salem, Mass. To be strictly accurate he was not exactly a bum, because he worked now and again on some kind of a WPA job in Boston. But he was a bum in the sense that his heart never was in his work. He indulged in just the minimum amount to keep body and soul together. Have you ever tried to figure out the absolutely minimum amount of cash on which you could exist for say a month or a year?"

Although I had speculated on the subject many a time, I admitted I never had found a satisfactory answer. The minimum amount on which I could exist always worked out as the maximum amount I could earn. Like the traditional expense account it was just enough. Pray, why should he drag me into the argument? Why not stick to the picture and the bum or semibum he picked up some where on the North shore?

"Well," said Bill, "I'll tell you. This here now picture showed one of the old time hoboes balancing the tomato can over the jungle fire. He was in a what Pat O'Malley calls a semirecumbent position and although his clothes were not exactly what the well dressed man of the day was wearing, he apparently was healthy and happy. His philosophy of life was presented in the caption, the essence of a speech or a sermon in any man's language, 'Well if *you* are so smart, why the hell ain't you rich?' Supposed to be funny, the caption had a bitter sting.

"This lad we picked up on the road was not dressed in the conventional tramp costume and he did not carry a tomato can, but he suffered from moveonitis, a peculiar form of disease which prevents the patient from landing and taking root any place. His mind was easy. His summer work was done and he now was heading for a certain point in the state of Maine where he proposed to spend the fall and winter in camp with a few boon companions. Needless to say he did not contemplate soiling his hands with manual labor during the period of hibernation.

"He was a gabby kind of a bird and stayed with us as far as Gloucester, a little out of his way and off the main line, but he said he was in no hurry. The gorgeous homes and grounds in this section of the country, representing probably the greatest concentration of wealth in any area of equal extent, excited neither his envy or admiration. He recited a short poem, modestly admitted as his own composition, to explain his preference for the little camp way down in Maine. I have a copy of this literary gem lying around some place. I'll look it up in a few minutes.

"As a free lance performer he had worked for short periods at a wide variety of jobs, including short hitches in foundries. Several reminiscences covered a season he sailed the Great Lakes as a coal passer on an ore boat. The last trip of the season found the boat in Fort William waiting for the owners to make up their minds whether to load her with grain or bring her down light and moor her for the winter. Elevators in Buffalo were crammed to the bursting point. The grain would have to lie in the ship all winter. Congestion in the spring might prevent an early start at the opening of navigation. Running a ship or a fleet of ships is no job for a growing boy.

Old sea dog finds new species

"In the line of duty the captain had to go ashore on several occasions. He returned from one of these expeditions pickled to the Plimsol mark according to a properly scandalized member of the engine room crew who hastened to pass the word around. This member with a singular lack of respect, also reported that the bloated old walrus not only had made an exhibition of himself in a foreign port, but had picked a dog up some place and carried him aboard under his coat.

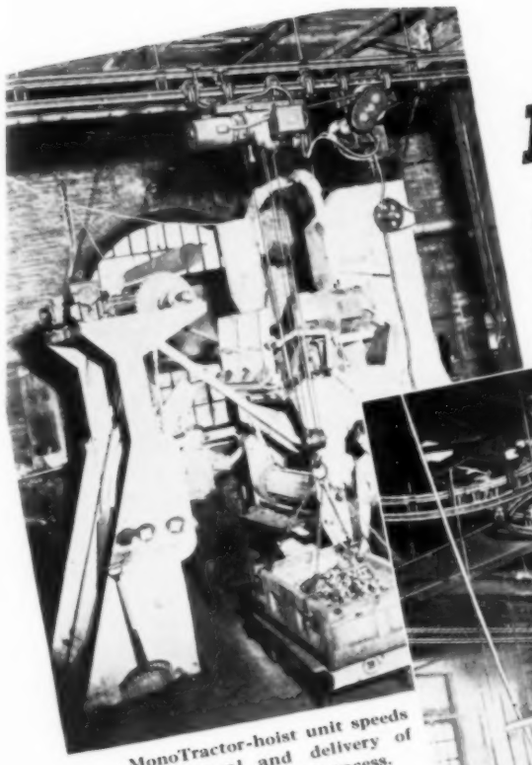
"Next day the lady owner of the dog accompanied by two eye witnesses of the dognapping, also one large policeman, appeared on the dock. She condemned the steamer, the owners, the captain and the crew as a public disgrace to the Great Lakes and wound up by demanding instant release of Doodlum Dix of Fleecy Cloud Hollow, a blue ribbon winner at the recent Toronto dog show. The chief officer told her politely she was barking up the wrong tree. They had no dog aboard and would she kindly pipe down? Members of the crew immediately lined up as violent partisans of the lady or the captain. One faction offered to bet anything from two bits to a month's pay that the captain would smuggle Doodlum south of the border and present it to the little woman. To quote one old grizzled veteran. 'The old pot bellied tub of mortified cheese has a tender, sentimental streak in his otherwise cast iron heart. He'll tell the wife he paid $40 for the thing just to make her happy. She believes him with the usual wifely discount and holds the mutt in her lap while they drive to Florida for the winter.' End of quotation.

"The other faction with equal confidence placed their money on the lady.

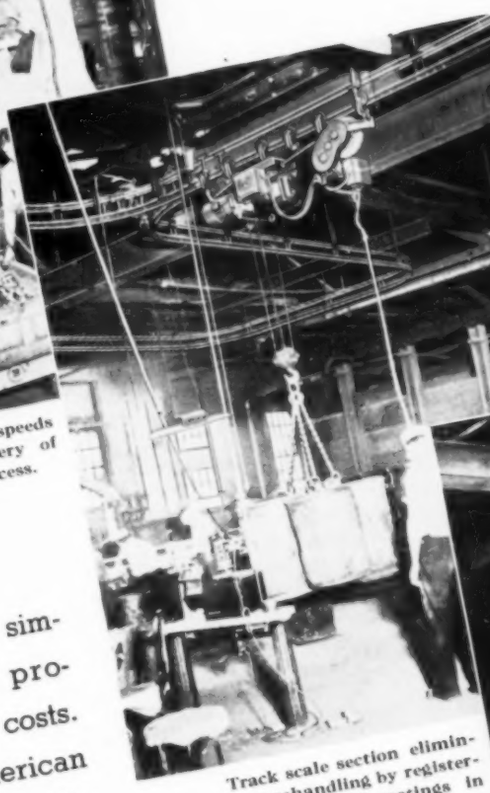
(*Continued on page* 62)

MECHANIZE your simple jobs!

Power operation will speed up your production and cut down handling costs.



MonoTractor-hoist unit speeds up removal and delivery of castings to cleaning process.



Track scale section eliminates rehandling by registering weight of castings in transit.

Heavy loads are easily and quickly moved by power operated equipment.

It's the time-consuming, simple jobs that tie up production and pile up costs. Hence, when an American MonoTractor with electric hoist takes over the handling operations, bottlenecks disappear, materials move smoothly between process and costs inevitably fall.

With their specialized experience, American MonoRail engineers are often able to discover hidden possibilities for the application of simple handling systems that bring an immediate return from a small investment. This service is available from district offices located in every industrial center.

How Problems are Solved!

Write for copy of this "Blue Book" containing hundreds of illustrations showing solutions to a wide variety of handling problems.

THE AMERICAN MONORAIL CO.

13104 ATHENS AVENUE, CLEVELAND, OHIO

(*Continued from page* 60)

"'It's a cinch,' Micky Mulcahy, fireman speaking. 'When one of dem dere dames makes up her mind to get any ting on two legs or four, she gets it. In dis here case she eider gets de dog or she'll tie de ship up in some kind of a legal knot dat will hold her here until de lake freezes over. De old man may be dumb, but he ain't goin' to risk losing his ticket.'

"Every night great flocks of wild ducks and other migratory water fowl streaming south from the Arctic, lighted on Thunder Bay for rest and refreshment before again taking the air line for a winter holiday in the land of flowers and sunshine. The captain decided to cruise around and maybe knock over one or two dozen of these wanderers. He ordered the crew of the port life boat to swing her over and lower her into the water.

"I don't know the weight of one of these craft, but believe me they weigh plenty, at least 2 tons. In all fiction a couple of men hook on the falls, swing out the davits and lower the boat into the water. Some times the hero does it alone. Never a word about the back breaking job of turning the cranks that lift the boat out of the chocks, or the holding back on the same cranks while the boat is descending. In this instance the boat was launched safely. The crew climbed in, sulkily manned the heavy oars and pulled the big, heavy boat all day over Thunder Bay, while the captain sat in the stern sheets and gave directions. Unlike the young lady of Niger who went out to ride on a tiger, they came back that same night all ready for fight and with a single skinny duck to show for the day's work.

"The captain vowed he was going out again the following day. He was not going to have any silly flock of ducks make a monkey out of him. 'Pull the boat up just clear of the water' says he, 'and leave her there until morning. Save time and labor. We'll be off at daylight tomorrow.'

"Coming on duty at the regular time that night the first assistant engineer found a note from the chief instructing him to pump out the ballast tanks. Assistant engineers do not go around asking the chief if he wants a certain job done right away or some time next week. 'Tis not to reason why, 'tis but to do or die and all that there kind of stuff. The chief wanted the ballast tanks pumped out. All right. He, the assistant, would pump 'em out, right now pronto. He knew nothing of the boat hanging alongside, immediately in front of and below the discharge pipe from the tank. He started the pump, lighted his pipe and settled back comfortably for a few chapters from *The Purple Kimono*, by Mrs. E. D. E. N. Southworth, a highly interesting romantic novel from the latest batch donated to the ship's library by the Lake Carrier's association.

"There is an old saying that blood is thicker than water. Water may not be very thick but it weighs 8 1/3 pounds to the gallon and it is simply amazing how many gallons a life boat will hold. This one held until the water started to flow over the gunnels when the davits straightened out and allowed the boat to drop into Lake Superior where it remained awash all night. The air chambers or pontoons prevented the boat from sinking any farther, but no agency was present to prevent everything portable from floating away.

"The davits had to be unshipped, heated in a portable forge, bent to shape and replaced before the boat could be lifted far enough to be pumped out. All these things take time. Although the captain persisted and kept his crew rowing him about all the following day, he came back at night without a single duck. When the cook asked him what he wanted done with the first duck, the captain told him to cook it and serve it up at the evening meal.

"The same evening the lady appeared again on the dock accompanied by her body guard, three or four personal friends and a policeman with a very sad countenance and—according to Mr. Mulcahy—a pair of the longest feet ever seen hanging to a human being. The lady demanded her dog. She claimed that not only had she the evidence of a number of credible witnesses, but on the preceding night she had a vivid dream showing her the exact spot in the boat interior where precious old Doodlum was concealed.

"As before, the first officer assured her she was mistaken. The ship would not tolerate the presence of a dog of any kind. As a matter of fact the captain and several members of the crew were allergic to dogs and as a result even the dog watch had been abolished. The lady replied icily that she was not interested in the present physical condition of the captain and crew. She begged to point out that she had right and justice on her side. She was a personal friend of the stipendiary magistrate and the jailer. She had written to the vessel's owner and to the Lake Carrier's association in Cleveland. Her husband had gone to school with the Minister of Marine at Ottawa. Unlike Helen of Troy she had not a puss to launch a thousand ships, but if necessary she would and could hold this one ship until her dog was restored to her. Were they by any chance allergic to sheriffs, plain and uniform policemen, process servers, and the North West Mounted Police? If they

(*Concluded on page* 112)

Ungrateful little duck snatcher ruins perfect alibi and threatens to throw Captain and whole doggone crew in the dog house

A·F·A NOMINATES OFFICERS and DIRECTORS

Herbert S. Simpson

Duncan P. Forbes

THE nominating committee of the American Foundrymen's association, which was appointed at the Chicago convention, recently met and nominated the following for officers and directors of the association for the coming year: President, Herbert S. Simpson, president, National Engineering Co., Chicago; vice president, Duncan P. Forbes, president, Gunite Foundries Corp., Rockford, Ill.; directors, R. J. Allen, consulting metallurgist, Worthington Pump & Machinery Corp., Harrison, N. J.; J. G. Coffman, vice president and plant manager, Los Angeles Steel Casting Co., Ltd., Los Angeles; W. J. Corbett, vice president, Atlas Steel Casting Co., Buffalo; M. J. Gregory, factory manager, foundry division, Caterpillar Tractor Co., Peoria, Ill.; and Lester N. Shannon vice president, Stockham Pipe Fittings Co., Birmingham, Ala.

Members of the nominating committee were as follows: Hyman Bornstein, Deere & Co., Moline, Ill.; Marshall Post, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; Henry S. Washburn, Plainville Casting Co., Plainville, Conn.; F. A. Melmoth, Detroit Steel Castings Co., Detroit; C. V. Nass, Fairbanks, Morse & Co., Beloit, Wis.; H. F. McFarlin, Lunkenheimer Co., Cincinnati; and R. K. Glass, Republic Steel Corp., Buffalo.

Herbert S. Simpson

HERBERT S. SIMPSON is president of the National Engineering Co., Chicago and for practically all his adult life has been connected with the foundry and foundry equipment industry. His father the late P. I. Simpson, who died in 1917, was a veteran foundryman and was

(*Continued on page* 68)

Lester N. Shannon

J. G. Coffman

W. J. Corbett

R. J. Allen

M. J. Gregory

Are You Specifying "NORTON RESINOID" for Your Portable Grinders?

BIG users of big snagging wheels run comparative tests—they have their own evidence of grinding wheel efficiency.

—and the Norton Resinoid invariably holds a high record for low costs.

Now what about the wide variety of sizes and types of wheels for portable grinders? They're harder to check for comparative performance but just as important in the long run.

The same Norton research goes into them, the same abrasives and bonds. They are made by the same processes, same equipment, same skilled workers.

And the same Norton engineers are ready to help you get the right wheels for your portable grinding jobs.

And you can get the same efficient low-cost operation.

W-794

NORTON COMPANY, WORCESTER, MASS.

New York Chicago Detroit Philadelphia
Pittsburgh Hartford Cleveland Hamilton, Ont.

NORTON ABRASIVES

"60% Better Than Previous Cut-off Wheels"

Says Brass Foundry

THAT'S the production figures on a Norton rubber bonded cut-off wheel (16 6-U6R) in a Texas brass foundry as compared to the competitive wheel originally used. And in countless other non-ferrous foundries the Norton improved rubber wheel is showing similar economies for cutting gates and risers.

It's a wheel that was developed by Norton research especially for this work. In both abrasive and bond it was engineered for its job. The result is a wheel that combines fast cutting action with economical life.

In these times, when production is paramount, you'll find a Norton wheel on an efficient cut-off machine the fastest way to remove gates and risers from brass, bronze, copper, aluminum, monel metal and similar castings.

Let a Norton engineer give you the benefit of his experience.

W-795

NORTON ABRASIVES

(*Continued from page* 65)

the inventor of the first gear molding machine, brought out in Minneapolis in the early eighties. Later he developed the type of sand mixer still known under the family name. Herbert S. Simpson was born in Minneapolis in 1884, but in early youth moved to Chicago where he was educated. His first industrial position was with the Hadfield-Penfield Steel Co., Bucyrus, O., where he became sales manager and later assistant to the president. In 1917 he returned to Chicago to become associated with the National Engineering Co., manufacturers of sand mixers and other foundry equipment. He has been president of the organization since its incorporation. He is a past president of the Foundry Equipment Manufacturer's association, past director of the American Foundrymen's association and for many years has supported the various research activities of the association. Mr. Simpson served as vice president of the association during the past year. He is a past president of the Kiwanis Club of Chicago, former alderman in his home town Evanston, Ill., chairman of the finance committee of that body 1931 to 1934. He is a trustee of the Evanston library board. In recent years he has traveled widely to Australia, South America, Mexico and in frequent journeys to Europe.

Duncan P. Forbes

DUNCAN P. FORBES nominated as vice president of the A. F. A., for the coming year, is president and general manager, Gunite Foundries Corp., Rockford, Ill. A native of Rockford, Mr. Forbes comes from a long line of foundrymen. His great grandfather, Duncan Forbes, was a pioneer in the production of malleable iron in America and established the present company in 1854. The present Mr. Forbes was graduated from Yale University, New Haven, Conn., in 1919. The following year he took post graduate work at Yale where he specialized in metallurgy. Later he spent some time in the laboratory of Prof. Enrique Touceda, Albany, N. Y., studying the metallurgy of malleable iron. In 1921 he entered the employ of the Rockford Malleable Iron Co., as a molder. A year later he was appointed junior metallurgist. Later he was appointed molding foreman and was made works manager in 1925. When the Gunite Corp. was organized in 1928 he was elected president. Later he was elected president of the Rockford-Northwestern Malleable Corp., which became the Gunite Foundries Corp., in 1932. He is a former director of the Malleable Iron Research institute, a past director of the American Foundrymen's association and a member of the A. S. M. and the S. A. E. He is the author of several papers presented before annual and other meetings of the A. F. A. and other associations.

M. J. Gregory

M. J. GREGORY, factory manager, foundry division, Caterpillar Tractor Co., Peoria, Ill., was born in Rhode Island and was educated in the public schools in that state. He then served as an apprentice at the Brown & Sharpe Mfg. Co., Providence, R. I. This was followed by study at Brown university and Massachusetts Institute of Technology. At the latter institution he was a student of metallography under the personal direction of Dr. Albert Sauveur. Mr. Gregory is a past chairman of the Quad-City Chapter of the A. F. A., and has appeared as a speaker before many of the association's chapters.

Lester N. Shannon

LESTER N. SHANNON, retiring president of the American Foundrymen's association and nominated as a member of the board of directors for the coming 3-year term is vice president and works manager Stockham Pipe Fittings Co., Birmingham, Ala. His entire career has been in the South where he was born in Carbon Hill, Ala., in 1893. Early education in the public schools was followed by attendance at Birmingham Southern college from which he was graduated with a bachelor of science degree in 1912. His first industrial connection was with the Stockham company where he has risen to his present position. He has been a member of and active in the affairs of the American Foundrymen's association for many years. At the formation of the Birmingham Chapter of the A. F. A. in March, 1936 he was elected the first chairman. He is a member of the American Society for Testing Materials and American Society of Mechanical Engineers.

J. G. Coffman

J. G. COFFMAN, vice president and plant manager, Los Angeles Steel Casting Co., Los Angeles, began his foundry career in 1901 with the Franklin Steel Castings Co., Franklin, Pa. In 1903 he joined the National Malleable & Steel Casting Co., and held the position of head of the melting department until 1911. In that year he went to the Pacific coast as melter for the Pacific Coast Steel Co., San Francisco, where he remained for 2 years. In 1914 he became general superintendent, Noble Electric Co., Heroult, Calif. He was general open hearth superintendent for the Southern California Iron & Steel Co. from 1915 to 1923. When the company built a new plant in 1919, he was superintendent of construction. Later when the plant was placed in operation in 1921 he had charge of the open hearth and electric furnaces. For the past 17 years he has been connected with the Los Angeles Steel Casting Co., Ltd., Los Angeles. Mr. Coffman was president of the Southern California Chapter of the A.F.A. in 1938-1939.

R. J. Allen

R. J. ALLEN, consulting metallurgist, Worthington Pump & Machinery Corp., Harrison, N. J., was born in Port Huron, Mich., and was graduated from the University of Toronto in 1913 with a bachelor of science degree. After several short miscellaneous connections he became metallurgist for Rolls-Royce of America Inc., Springfield, Mass., and held that position until the company discontinued operations in the United States in 1930. Immediately afterward he became chief metallurgist for the Worthington Pump & Machinery Corp., with direct supervision over all metallurgical activities in all plants operated by the corporation. For the current year he is chairman of the Metropolitan Chapter of the A. F. A.

William J. Corbett

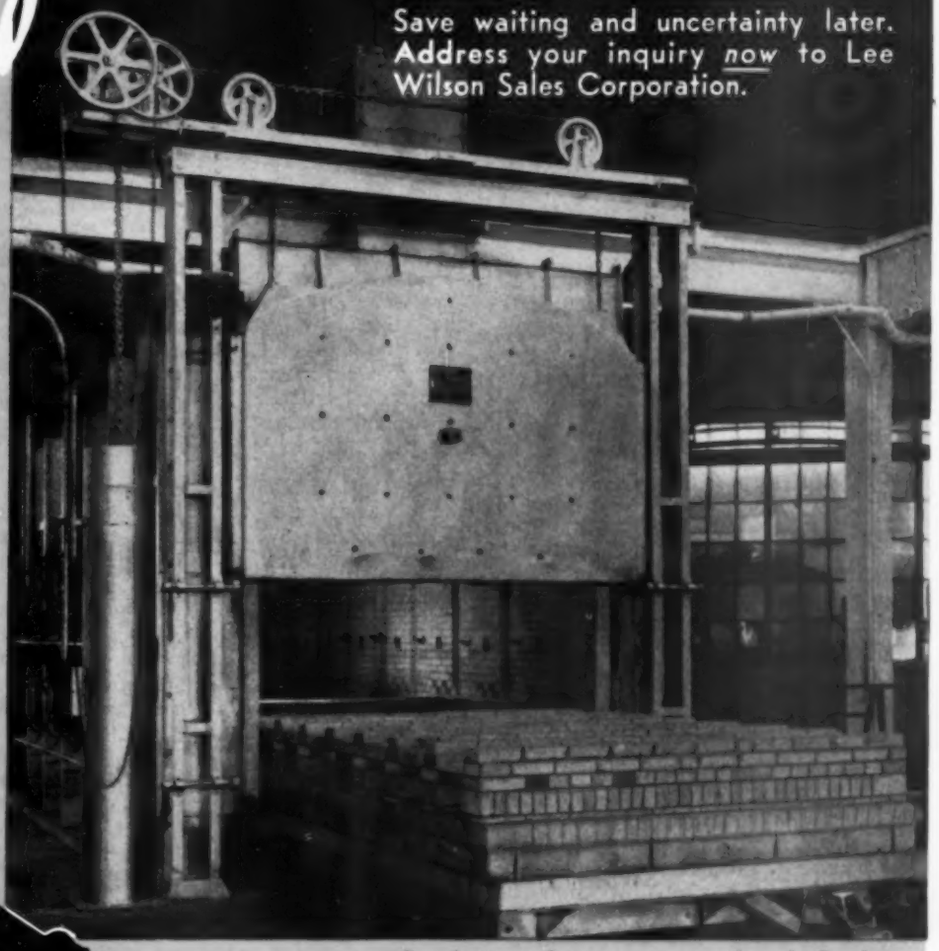
WILLIAM J. CORBETT, for the past 7 years works manager, Atlas Steel Casting Co., Buffalo, has had a wider and more interesting career than falls to the lot of most foundrymen. He was graduated from Carnegie Institute of Technology as a bachelor of science in mining engineering in 1914. Later he received the degree of metallurgical engineer from the same institution. After a year, as a special apprentice at the Alliance, O., plant of the American Steel Foundries, he was transferred to the Chester, Pa., plant of the same company. He joined the army in 1917 and served as ordnance inspector, first at Buffalo and later at the Watertown, Mass., arsenal. After the war he became assistant to the fourth vice president American Steel Foundries in Chicago. He became cost accountant for the Steel Founder's society in 1921 and in 1923 was appointed industrial engineer for the Electric Steel Founder's Research group, a group of five electric steel foundries doing research and control work under the direction of the late Robert A. Bull. From 1925 to 1929 he was secretary and manager Steel Founder's Society of America. In 1929 he became assistant to the president Fort Pitt Steel Casting Co., McKeesport, Pa., and in 1933 works manager Atlas Steel Castings Co., Buffalo. He has contributed a large number of articles to the trade press and at meetings of the

(*Concluded on page* 70)

Be Prepared

to answer that important question in these busy times, "What is the best type of furnace for ordnance and commercial forging and heat treating, whatever the job may be, and what will it cost?"

Save waiting and uncertainty later. Address your inquiry *now* to Lee Wilson Sales Corporation.



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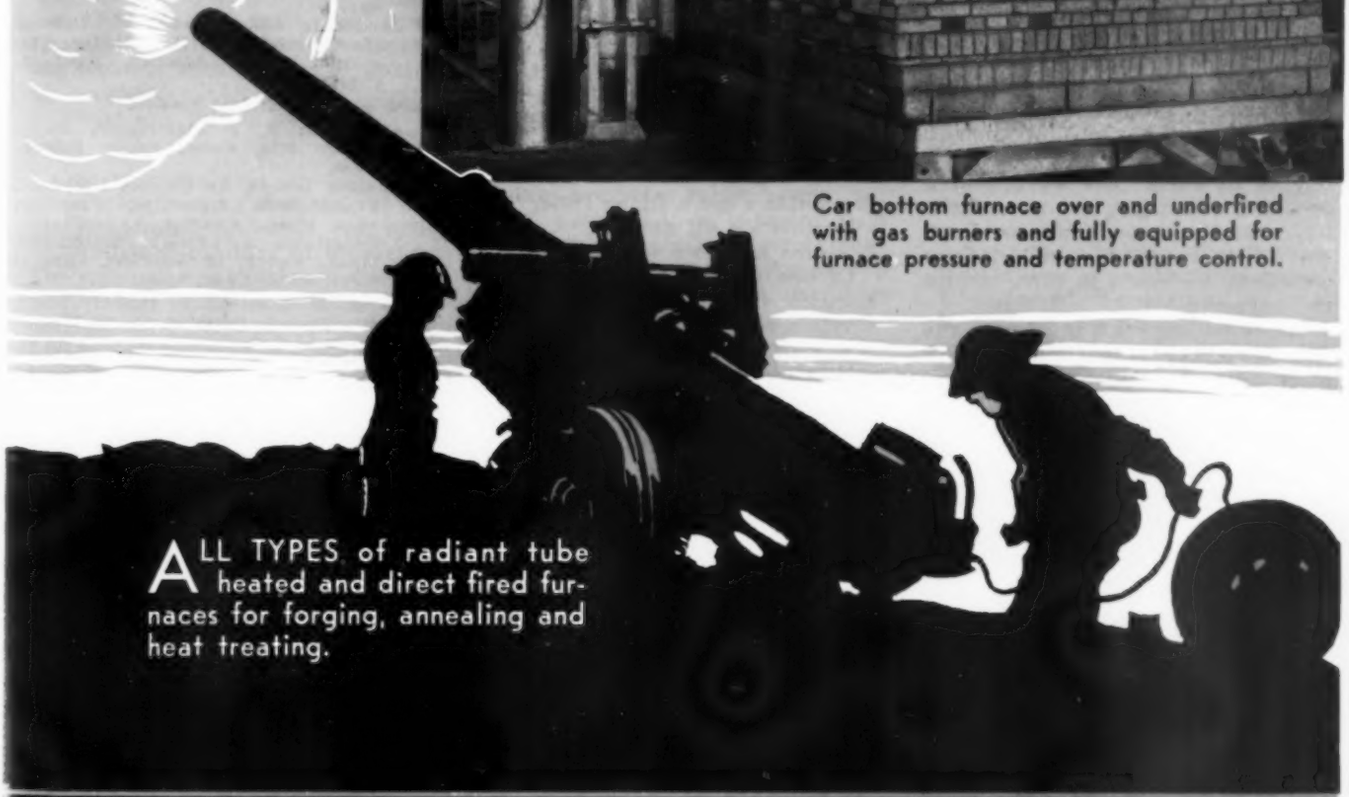

ALL TYPES of radiant tube heated and direct fired furnaces for forging, annealing and heat treating.

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(*Concluded from page 68*)

A. F. A., and other technical associations on steel foundry costs and design of steel castings. In addition to the A. F. A., he is a member of the A. I. M. E., and the A. S. S. T. Mr. Corbett also served as chairman of the Western New York chapter of the A. F. A. during the year 1939-40.

READER'S COMMENT

Readers are invited to comment upon articles and other editorial material appearing in THE FOUNDRY. *The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief.*

THE EDITORS

Inspiration Needed

TO THE EDITORS:

Your editorial in the February issue, "Why Not Exhibit Castings," was read with great interest and I should like to stimulate in every possible way, the activity suggested.

The comment of Leon J. Wise to the effect that "no user likes to think he is buying the products of a decaying industry," touched bottom with me because I am afraid that there are all too many men in our industry who have been almost ready to admit that they were passing out, and of course that's not to be wondered at when you consider some of the burdens, such as various state silicosis laws, that have been imposed upon them.

That brings me back directly to your comment on the subject in which you say, "But these serve more to inspire foundrymen than to educate engineers." I am wondering if maybe inspiring all the foundrymen to again believe in themselves isn't the first answer to the question. To have even a few of us think that we are in a decaying industry is a definite blight and perhaps if we could get rid of that attitude and inspire ourselves, we could in turn, inspire the engineers.

Today we are confronted with the defense problem—most of us have more business than we know what to do with, and that brings us to a time when we could afford to do something and probably won't do it because we don't need any more business, and then wait to do this necessary thing until we have so little business that we cannot afford individually to participate.

It was my pleasure recently to attend a meeting of the A. S. M. E. at which President Hanley was present, and I discused this subject briefly with him. In the Buffalo territory we are trying to hold joint meetings with the A. S. M. E. so that they may get inside information as to the progress of our industry that we discuss among ourselves, but I still think an exhibit of actual castings is vital.

Couldn't the industry afford to set up an exhibit with someone in charge of it, available for movement from place to place, where interested bodies of engineers are having their conventions? It only involves the gift of a few castings, the freight to convention destination, and the return to some permanent exhibit spot, salary of a custodian and the local co-operation of some foundrymen at every engineering convention place.

But whatever we do, let's do it now while we are busy and have the money and can inspire both the laggard foundrymen and the buyers who may have been led astray. Hardly an element of defense can be started without some machine that requires castings, so we are at the foundation of this defense program and we should not "hide our light under a bushel."

ELIOT ARMSTRONG,
Executive Secretary
Inter-Allied Foundries of New York State, Buffalo

We Molders!

TO THE EDITORS:

We molders are a funny tribe,
To this we all agree.
It seems as if we were all born
Of one large family;
Excuses that are centuries old
When castings didn't run,
Are used today the same old way
When work goes on the bum.

We are full of human weaknesses
Like any tribe of men,
But when we make excuses,
Who can surpass us then?
Remember Ananias,
He bore a famous name,
Why he is just a piker
When we molders play his game.

We blame it on the metal,
Perhaps it is the sand,
The cores were poorly vented
And blew to beat the band;
The flasks, why they all shifted
Because the pins were loose;
So don't argue with a molder,
What the hell's the use?

W. E. GILLESPIE
Patt. Shop Supt.
Goulds Pumps Inc.
Seneca Falls, N. Y.

Arrange Program for Boston Conference

An extremely interesting program has been arranged for the fifth annual New England foundry conference which will be held at the Massachusetts Institute of Technology, Cambridge, Mass., on Friday and Saturday, March 28 and 29. The conference is under the joint sponsorship of the New England Foundrymen's association, Connecticut Foundrymen's association, Connecticut Nonferrous Foundrymen's association and the Massachusetts Institute of Technology. Joint committee which planned the affair is under the chairmanship of A. S. Wright, Hunt-Spiller Mfg. Corp., South Boston, Mass. Tentative program as arranged follows:

Friday, March 28

9:00 a. m.—Registration, Main lobby.

10:15 a. m.—Opening Remarks.
Chairman: Walter Sanders, Providence, R. I.
Address of welcome from Massachusetts Institute of Technology.

10:30 a. m.—Luman S. Brown Session.
Chairman: W. W. Rose, executive vice president, Gray Iron Founders society, Cleveland.
Job Evaluation, by A. L. Kress, National Metal Trades association, Chicago.

12:30 p. m.—Luncheon, North hall, Walker Memorial.

2:00 p. m.—Technical Session.
Chairman: Dr. Robert S. Williams, Massachusetts Institute of Technology.
Aluminum Alloys and Their Casting Characteristics, by P. M. Budge, Aluminum Co. of America, Fairfield, Conn.

3:30 p. m.—Technical Session.
Chairman: R. F. Harrington, Hunt-Spiller Mfg. Corp., South Boston, Mass.
Casting Design, by Charles Burkhart, Framingham Foundries, Framingham, Mass.; Charles A. McCarthy, Watertown Arsenal, Watertown, Mass.; and F. H. VanNest, General Electric Co., Lynn, Mass.

6:00 p. m.—Conference Dinner, North hall, Walker Memorial, A. S. Wright presiding.

Saturday, March 29

9:00 a. m.—Registration, Main lobby.

10:00 a. m.—Technical Session.
Chairman: Donald F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.
Surface Finish of Castings, by W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J.

12:10 p. m.—Luncheon, North hall, Walker Memorial.
Coffee talk.

2:00 p. m.—Technical Session.
Chairman: T. Joseph Judge, Jenkins Bros., Bridgeport, Conn.
Bronze and Nickel Alloy Castings, by Ernest F. Stone, Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

3:30 p. m.—Technical Session.
Chairman: Raymon Meader, Whitin Machine Co., Whitinsville, Mass.
Rigging for Production, by J. C. Alberts, Plainville Casting Co., Plainville, Conn.

5:15 p. m.—Adjournment.

6:30 p. m.—Smoker.

FOUNDRY DEVELOPMENTS AT SHORT RANGE

ACCORDING to *Recommended Good Safety Practices for the Protection of Workers in Foundries* published by the American Foundrymen's association, the following precautions should be taken when repairing cupola linings: A substantial screen or guard shall be provided in the cupola and located above any workmen working therein to protect them against falling objects. Such screens or guards shall be constructed of not less than 1½ x 1½ x ¼-inch angle iron covered with a screen, the equivalent in strength of a 1-inch mesh of $\frac{5}{16}$-inch wire or not less than No. 12 U. S. gage solid sheet steel. Provision shall be made for supporting securely such screens or guards by overhead slings or underpinning to resist any falling objects.

* * *

One machine tool producer employs alloy iron for the integral bed and headstock, front slide, rear slide and tailstock castings of its lathes. The range of composition is given as silicon 1.50 to 1.90 per cent; manganese 0.50 to 0.70 per cent; nickel 1.00 to 1.50 per cent; chromium 0.40 to 0.60 per cent, and total carbon 3.30 to 3.40 per cent.

* * *

In the founding of plated plumbing goods, valve, and kindred lines where good, smooth surfaces are essential, molding sand with the following characteristics will give good results: Permeability 20 to 25; green compressive strength 8 to 9, and moisture 6 per cent.

* * *

INCREASING interest in nonferrous castings production where the molding material is plaster of paris with or without addition of fibrous or other materials is indicated in several patents recently granted. One of the difficulties cited in plaster molding is the extremely long period required for setting or solidification when large excess of water is needed to obtain a suitable working mixture. Another is obtaining a very smooth surface free from any air bubbles while still another is providing an extremely permeable structure behind the mold face. A fourth is obtaining an accurate reproduction of pattern detail. In one process a number of those are accomplished by a special machine which churns the liquid plaster violently to create considerable turbulence, and then stops suddenly to give a jolt or concussion which directs the plaster against the pattern face in the machine. Suitable plaster mixture is composed of 80 parts gypsum and 20 parts asbestos pulp which is placed dry in a suitable box on the machine, and 160 parts of water at 180 degrees Fahr. is added. A cover is placed over the box, and the machine started. It is claimed that the procedure promotes rapid setting, uniform suspension of asbestos pulp, and provides excellent permeability.

Another procedure involves subjecting the plaster mold after it is made to the action of saturated steam in an autoclave at a temperature above 110 degrees Cent. (230 degrees Fahr.) at about 8 to 15 pounds per square inch gage pressure. The inventor states that at 9 pounds per square inch gage pressure about 9 hours treatment is required, but decreases with increase of pressure and temperature. After treatment the molds are allowed to age for 3 to 16 hours under normal atmospheric pressure with or without a saturated condition. A wide variety of plaster mixtures may be employed such as 84 parts water, 60 parts plaster, 25 parts silica, and 15 parts talc; 100 parts water, 80 parts plaster and 20 parts talc, or 65 parts water and 100 parts plaster. For use with magnesium and its alloys sulphur and boric acid may be incorporated in the mixture, or dusted on the mold surface. It is claimed among other features that the process gives a very fine grain surface which gradually becomes coarser away from the face, and that the mold possesses excellent permeability. Also a small amount of uncombined water left in the mold acts as a chill on molten metal, such as aluminum, poured into the mold.

* * *

LINER for a steam valve chest on a pump employed in cementing oil wells is cast centrifugally from an iron containing 3.20 to 3.30 per cent total carbon, 2.30 to 2.40 per cent silicon, 0.80 per cent maximum manganese, and 1.00 per cent maximum molybdenum. After casting the liners are normalized from 1800 degrees Fahr. and drawn at 1000 degrees Fahr., and drawn to produce a hardness between 40 and 50 rockwell C. Final finish is accomplished by grinding and honing.

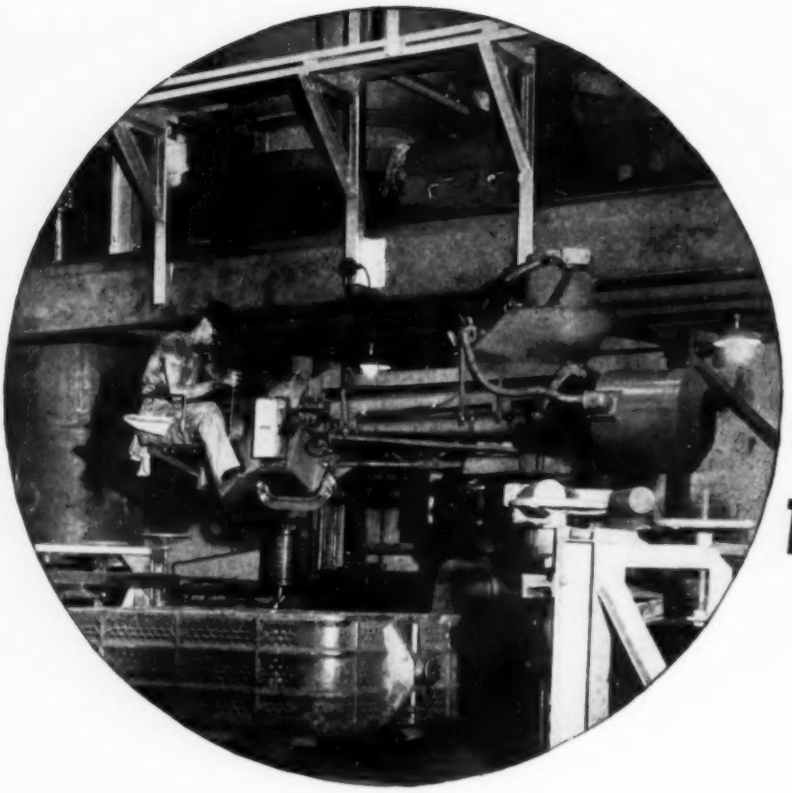
* * *

Since the efficiency of sodium carbonate as a desulphurizing agent is impaired when contaminated by silica, some experiments in England indicate that a ladle lining of tardolomite results in a marked improvement in the degree of desulphurization of the iron.

* * *

A modified glycerine-litharge cement that is waterproof, resistant to fairly high temperatures, and sets under water, may be used to repair pipe leaks. The cement is prepared by mixing equal parts of cement and litharge. For use the cement is mixed with glycerine in the proportion of 1 part by volume of cement to ½ part by volume of glycerine, and the whole mixed thoroughly with a spatula or flat blade knife or tool. In repairing the leak, the prepared cement is placed on the leak, covered with cheesecloth, and more cement applied to the cloth. The whole then is bound tightly with wire.

BETTER METHODS



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Have you seen the 1941 SPEEDSLINGER?

It rams up to 4,000 pounds of sand per minute.

The men who made the SPEEDSLINGER and SPEEDMULLOR available to the foundry industry are the same practical foundrymen who conceived, designed and developed the SANDSLINGER — the Better Method which has largely replaced the expense, monotony and drudgery of hand molding.

With the passing years and ever-increasing trend toward foundry mechanization, The Beardsley and Piper Company adopted the SANDSLINGER principle of mechanical ramming to every conceivable type of production and jobbing work — in steel, gray iron, non-ferrous and malleable foundries.

During these many years of service to the foundry industry, we have cooperated toward the solution of many production problems which have helped to ease labor's most burdensome tasks.

The past year has been a most noteworthy era in the development of Better Methods.

The engineering facilities and services of The Beardsley and Piper Company have been called upon for special equipments and systems to meet needs which have arisen over night.

In such emergencies our broad knowledge and world-wide experience have enabled us to design foundry methods to effect most profitable results from the least possible investment.

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FOR THE FOUNDRY

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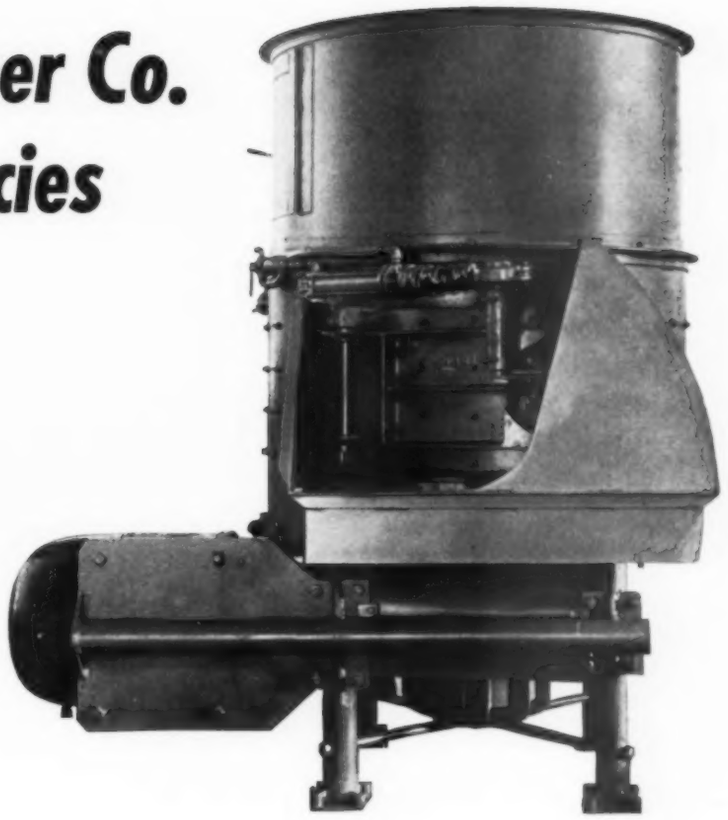


Have you seen the 1941 SPEEDMULLOR?

Compact; efficient; fast. It does what other mills don't.

The extra values attached to B&P services and equipment are the result of a vast fund of foundry experience and knowledge gained from foundries everywhere — twenty-five years of contact with foundrymen and foundries around the world.

In your search for greater profits from better mulled sand and better rammed molds, get the facts on SPEEDMULLORS and SPEEDSLINGERS.

THE BEARDSLEY AND PIPER COMPANY,
2541 N. Keeler Ave., Chicago, Illinois.

We would like complete information on

( ) *Speedmullors* ( ) *Speedslingers*
( ) *Sandslingers* ( ) *Screenarators*
( ) *Shakeouts* ( ) *Sand Conditioners*
( ) Sand and mold handling equipment

DETROIT AMONG FOUNDRIES

By A. H. ALLEN
Detroit Editor, The Foundry

THIRTY years is not a particularly long time, as industries go, but is sufficient interval to work vast changes in the complexions of many plants. Take the Atlas Foundry Co., Detroit, for example. That firm was organized in 1910 by the late Robert Crawford to supply a part of the needs of now-forgotten motor companies for cylinder blocks, heads, manifolds and other cast items. The plant was a busy place and the early books of the company show a wide assortment of castings shipped to such companies as Winton, E.M.F., Apperson, Graham. In peak periods employment ranged as high as 350 men in the foundry which gives some idea of its size.

Profits Difficult To Realize

For some reason, though, profits were thin. Some say that the boss, through the inherent goodness of his heart, gave the profits away charitably. Others maintain that with prices more or less dictated by customers, profits were difficult to realize.

Mr. Crawford was fortunate in having three agile sons who started to work in the foundry while still in short trousers. After their father's death in 1931, the three boys, W. B., R. B. and A. R., inherited the business and determined on an entirely changed policy of operations. Quality castings at quality price and service. An electric furnace of 1000-pound capacity was installed, unprofitable and highly competitive business was removed from the books and a new day dawned for Atlas.

Use the Meehanite Method

In 1937 the company acquired a license to produce Meehanite castings which are now better than 50 per cent of total business. At one time all high-strength irons and high alloyed irons were melted in the electric furnace giving a wide variety of analyses. Now, by selecting the proper "processed" Meehanite, castings having a thickness of ½-inch or 10 inches can be poured with equal ease to give dense structure, good machinability and high tensile strength.

Jobbing foundry work is a hectic business, mainly because you never know what is coming next. A steady flow of patterns, molds, cores and castings in widely assorted sizes and shapes must be kept moving constantly. One day will see an order for an 11-ton machine tool base, while the next may bring a call for several thousand small castings which weigh only half a pound apiece. To the uninitiated, scheduling such a diversity of output appears hopeless but a little experience provides the required dexterity of control to handle the demand.

Last month Atlas began tearing down three of its stoker-fired brick core ovens which have been in use since the plant was started in 1914, earlier operations having been at a different location. Taking the place of these retired veterans are two new 12 x 18-foot steel gas-fired ovens, one a through-type, the other opening at the front only. The two new ovens, supplemented by two smaller stoker-fired ovens retained from the former battery of four, will just about double corebaking capacity and will help greatly to clean up the molding floor by preventing cores from piling up while awaiting baking.

Increase Crane Capacity

The new ovens also will make it possible to dry molds to a greater extent, in place of skin drying as has been practiced heretofore. A new 10-ton crane will be installed shortly to accommodate the new ovens. This, with the three cranes already present, will improve materials handling operations to a marked degree.

The various Meehanite analyses are designed to suit a wide variety of work. Primarily a high-strength iron of up to 50,000 pounds tensile strength with a completely pearlitic matrix, it is used in machine tool parts such as bases and slides where good machining plus wear resistance is necessary or in various types of dies where a nonscratching hard surface is required. The metal can be heat treated and hardened when required or flame hardened when only the surface requires a high hardness. It may be used for heat resistant applications as in fixtures for centrifugal casting of brake drums, or in corrosion resistant applications.

Atlas currently is pouring about 30 tons of iron a day, five days a week, and operates the electric furnace on an average of one day per week. Bulk of current production is for the machine tool industry in the Detroit area—bases, columns, ways;

(*Concluded on page* 78)

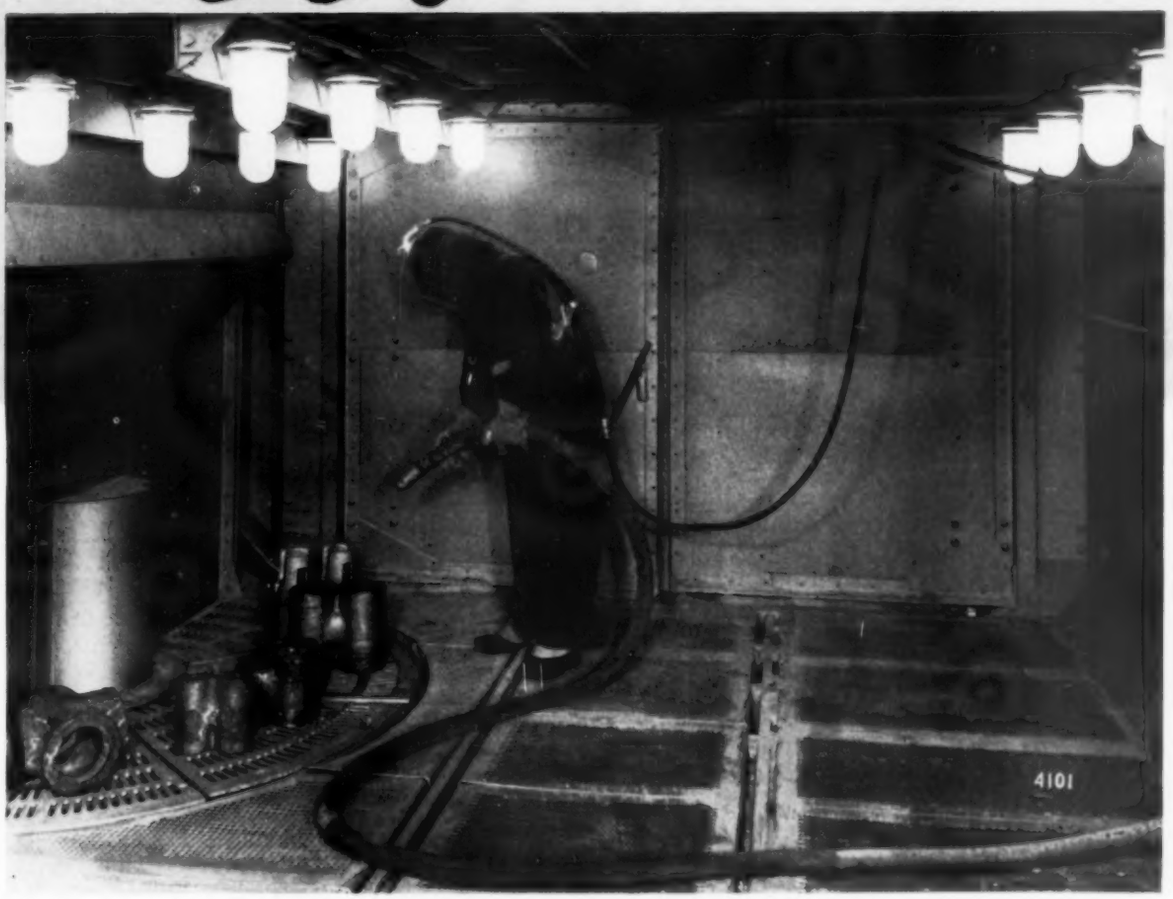
Rear fender punch casting weighing 6500 pounds for one of the leading makes of automobile. Made of high-tensile, chrome-molybdenum iron, the punch is flame hardened along the three speedlines to prevent undue wear

"Thoroughly Cleaned Castings"

"Proper Ventilation"

"Good Working Conditions"

with SLY BLAST ROOMS



This Sly Blast Room (10' x 12') is located in the recently built, thoroughly modern steel foundry of The Key Co., East St. Louis, Ill. Note turntable (at left) for smaller castings and tracks (in center) for car carrying large castings, to accommodate both small and large castings in the same room. It is lighted with Sly sturdy, dust tight fixtures.

4 Exclusive Features OFFERED ONLY BY SLY

1. *Triple Ventilating Ceiling*—insures unrestricted and uniform entry of ventilating air with *uniform* downdraft. Rebounding abrasive cannot escape through the ceiling or lodge in it.
2. *Double Walls and Doors*—built of rigid angle iron frame with 12 gauge plate exterior, $\frac{3}{16}''$ steel liner plates, easily replaceable.
3. *Angled Corners*—eliminate accumulation of abrasive in corners. Ventilating air leaves through ample openings extending full length of room on both sides, near floor.
4. *Strong, Perforated Floors*—promote safe footing. Plates are supported by grating of steel bars set on edge—assembled in interchangeable sections.

A better blast room, pleasingly economical in operation yet competitive in price. Ask for Specification Sheets S-74 and S-75.

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DUST CONTROL EQUIPMENT FOR EVERY INDUSTRIAL PURPOSE

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(*Concluded from page 76*)

for hydraulic equipment suppliers —valve and pump bodies and the like. Automotive dies also comprise an appreciable portion of the volume, particularly at this time of the year.

These days, when the demand for machine tools of all types is so stimulated, castings in that category take precedence over those for dies. The auto industry's 1942 program has been launched and while die requirements are not as extensive as they were for 1941 models, still they will require plenty of foundry capacity, and Detroit has no lack of such facilities.

One leading supplier of stamping dies for motor cars is the Acme Foundry Co., Detroit, which is pouring about 20 tons a day. Acme has been doing some interesting pioneering work in the development of chrome-molybdenum dies which can be flame hardened and cooled in air. Use of that type of die, with wearing surfaces flame hardened, obviates the necessity for tool steel inserts at those points. Inserts take long hours to fit and greatly extend tryout time. They gradually are being eliminated by the use of such die materials as Detroit Steel Casting Co.'s E-4 steel and Acme's Hi-tensilloy.

Analysis of the iron shows approximately 3.00 per cent total carbon, 0.60 manganese, 1.80 silicon, 0.40 chromium, 0.30 molybdenum, 0.06-0.09 sulphur and 0.10 phosphorus. Cupola charge is 70-75 per cent steel in the form of structural steel scrap (short rails being too high priced), 10 per cent return scrap from the foundry and the balance pig iron of the silvery type. Chromium is added in the charge in the form of ferrochromium briquets, two to the ton or the equivalent of 4 pounds of chromium. Molybdenum likewise is added as a 60 per cent ferroalloy, 12 pounds to the ton. This will vary somewhat according to the section of the casting being poured.

Being a low-silicon iron, ferrosilicon is added in the ladle, from 5 to 15 pounds per ton being sufficient to build up silicon content 20 to 40 points. Iron is tapped at 2800 degrees Fahr. and is poured at 2650-2700 degrees in dry sand molds.

Flame Harden Surface

As cast, the iron shows brinell hardness of 200 minimum which can be increased by flame hardening and air cooling to as high as 600. Test bars show tensile strengths in excess of 50,000 pounds per square inch, some ranging as high as 69,000 pounds. Structure under the microscope is almost entirely pearlite, with uniformly distributed graphite flakes. In the unhardened state, the iron is relatively easy to machine.

Typical castings are fender punches and dies, hood top dies, radio and refrigerator panel dies and the like. The accompanying illustration shows a fender punch, which will be flame hardened along the three speedlines or streamlines on the side. These normally would be tool steel inserts. The cost premium of 20 per cent over gray iron is more than made up by the elimination of inserts and the attendant labor, according to Acme officials.

Experimental work is being carried out by Ford technicians on centrifugal casting of cylinder liners and other parts for aircraft engines. Results seem to point to considerable savings in costs and, in the case of liners, exceptionally good physical properties. Comparing a cast liner with a forged steel liner of the type used in Pratt & Whitney radial engines, same dimensions, thicknesses, countours, etc., it was found that the cast piece showed bursting strengths of as much as 80 per cent beyond those of the forged liners.

Ford is reported to have developed an in-line 12-cylinder engine of his own design, similar to the Rolls-Royce Merlin engine which Packard is about ready to build, developing around 1500 horsepower. While as yet there are no plans for production of the Ford engine, it is understood that it is being designed to make use of cast steel parts such as liners, crankshafts, connecting rods and the like.

Building permit has been issued to Pontiac Motor division for a $90,000 addition to the foundry cleaning room.

This bulletin board arranged by the A.F.A. and Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., was displayed at the 1940 annual convention to emphasize that the foundry is a safe and healthy place

To Build Furnaces

Hydro-Arc Furnace Corp., 9 South Clinton street, Chicago, recently has been organized to design, build and market a new type of electric-arc melting furnace for the production of stainless steel and other metals and alloys. The furnace is operated hydraulically, and will be manufactured by the Whiting Corp., Harvey, Ill. W. Harvey Payne well known in the electric furnace field is president and general manager of the new firm.

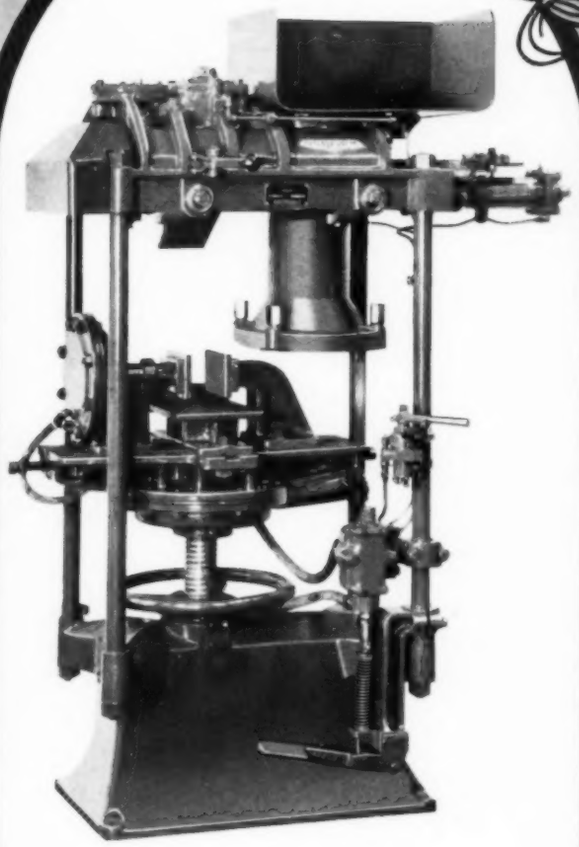
Bulletin Is Issued

American Society for Testing Materials has issued a 164-page bulletin entitled, "Index to A.S.T.M. Standards Including Tentative Standards" which lists the 581 standards and 371 tentative standards of the society under headings of subject and number, and indicates where they may be located in the three volumes of the A.S.T.M. *Book of Standards.*

Publishes Paper

Bureau of mines, Washington, has made available technical paper 609 which is entitled, "Bentonite: Its Properties, Mining, Preparation, and Utilization," by C. W. Davis and H. C. Vacher. Copies of the paper may be secured from the superintendent of documents, Washington, for 15 cents.

For Sale



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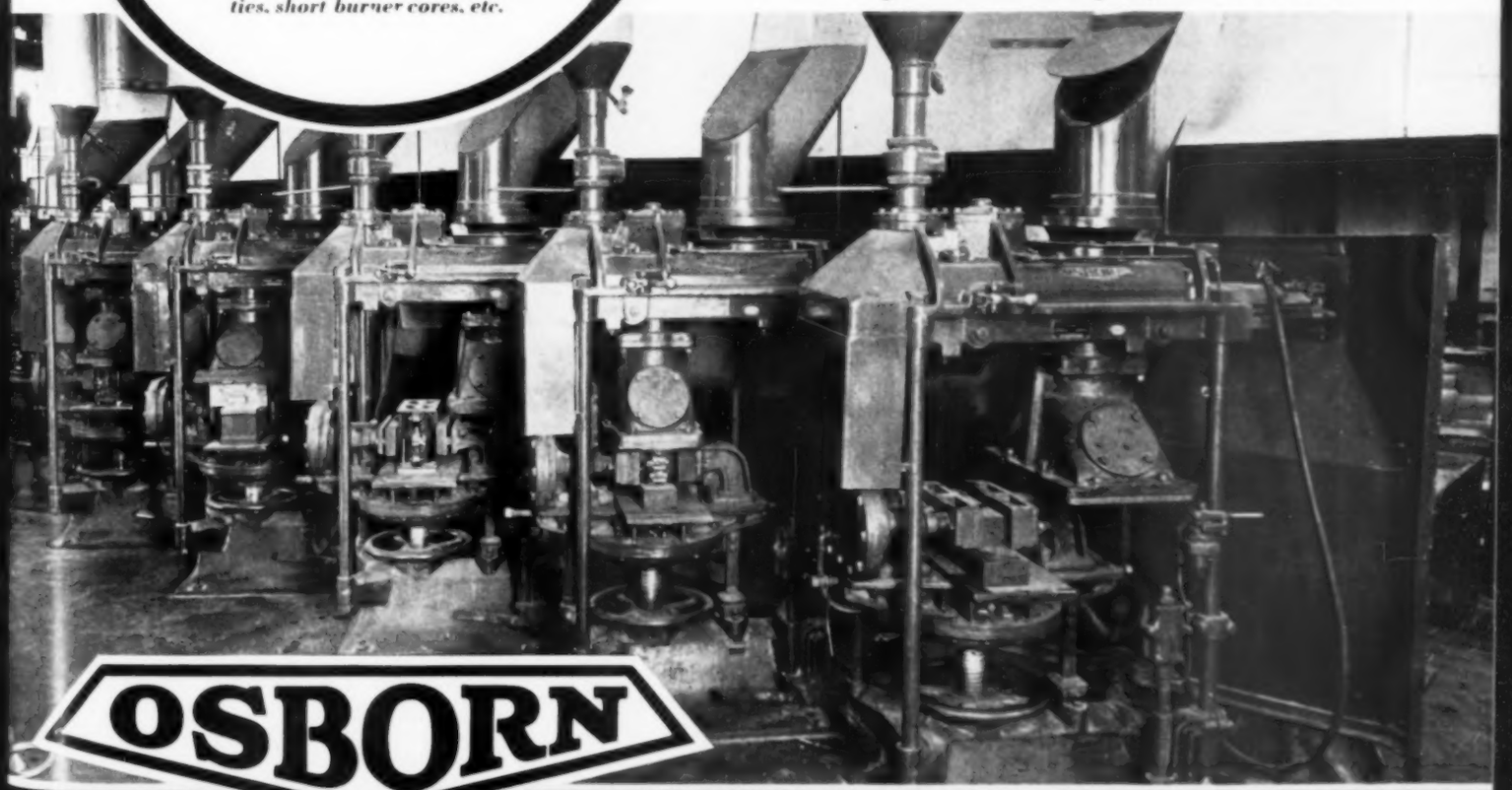

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CORE BLOWING MACHINES

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Central New York

REGULAR meeting of the Central New York Chapter of the A. F. A. was held at the Onondaga hotel, Syracuse, N. Y., Jan. 10. Frank C. Wheeler, chairman of the chapter, presided and announced that H. H. Judson, Goulds Pumps, Seneca Falls, N. Y., would be the speaker at the next meeting on the subject, "Gates and Risers."

Harry W. Dietert, Harry W. Dietert Co., Detroit, presented the fourth lecture on the subject "The Sand in Your Foundry," the subtopic for that lecture being "Cores." Mr. Dietert opened his lecture by distributing among the foundrymen present an outline of his lecture. These notes cover the subject thoroughly and are valuable to the foundrymen for reference work in the future.

Under the heading of "General Classes According to Temperature," those present were interested in the description of frozen cores as used in Russia to produce cylinder blocks. These cores contain 12 per cent moisture and are subjected to a very low freezing temperature. The vents in the cores are large, and, after pouring, the core will break down in approximately 4 minutes. Another interesting point is the fact that the iron does not boil when it comes in contact with the frozen core. The practice produces a very close structure in the metal, which is partly due to the chilling effect of the frozen core.

Mr. Dietert described the different types of core binders and gave instructions on the proper way to mix core sand. The speaker stated that while there was considerable controversy over the procedure of mixing he felt that for all ordinary purposes, most satisfactory results would be obtained if the foundryman mixed the different ingredients in the order of sand, clay, cereal, water, mixing these to maximum green bond, and then adding oil.

In modern core rooms it has been found possible to recirculate 2/3 of the gas from the ovens, adding to this 1/3 fresh air. In other words, about 1/3 of the oxygen is consumed in passing through the ovens. Most core oils give the maximum results when baked at a temperature near 400 degrees Fahr.

Mr. Dietert closed his lecture by stating that the gas content of any core is regulated by the selection of the binder and sand. After these materials have been selected, they must be baked at the proper temperature for an increased period of time.

Mr. Dietert's four lectures have been very well received by the foundrymen of Central New York, and in appreciation of his efforts in behalf of the Central New York chapter he was presented a desk set by H. H. Judson, the first chairman of the Central New York chapter.—*L. D. Wright, secretary.*

Pittsburgh

THE January session of the Pittsburgh Foundrymen's association, largest meeting of the year thus far, was devoted to steel foundry practice for the most part and attracted an attendance of 125 members and guests.

James H. Lansing spoke at the Wisconsin chapter meeting. Photo courtesy John Bing, A. P. Green Fire Brick Co., Milwaukee

Principal speaker was Walter H. White, Pittsburgh Rolls division, who talked on personnel problems in the light of present day problems in the steel foundry. With the aid of a number of slides he illustrated some of the problems met with in the production of castings for use in ordnance construction. In the latter section of his talk, Mr. White described solution to many problems encountered in production of shells, large parts for heavy artillery carriages and similar war-time jobs. Physical testing procedure used in some of these applications was described.

A sound-slide film outlining correct design procedure for manufacture of successful steel castings also was featured. Prepared by the Steel Founders' Society of America, the film described the basic principles of design, emphasizing the effects of improper design on production difficulties and indicating, through polarized stress diagrams, the effects of design on the strength of castings.

The March meeting will feature a talk by Earl Woodliffe, H. W. Dietert & Co., Detroit.—*R. L. Hartford.*

Wisconsin

ONE hundred and fifty members and guests attended the Jan. 17 meeting of the Wisconsin Chapter of the A. F. A. Following dinner a film was presented through the courtesy of the Allegheny Ludlum Steel Co. on the production of "Stainless Steel." The film was in color and sound and was very interesting and instructive.

Main speaker of the evening, James H. Lansing, foundry engineer, Malleable Founder's society, Cleveland, was introduced to the group by B. D. Claffey, president of the chapter. Mr. Lansing's topic was, "New Uses for Castings." To

(*Continued on page* 83)

(*Continued from page* 80)
illustrate his talk Mr. Lansing showed slides wherein certain steel, fabricated parts had been redesigned so that a casting could be made to replace the fabrication. He also showed where slight changes in design would permit the replacement of several forgings with malleable iron at a much reduced cost. In some of these cases he explained that such castings have additional corrosion resistance over a welded or fabricated part. Mr. Lansing's talk was well received and very interesting to the group.—*H. C. Waldron, secretary.*

Philadelphia

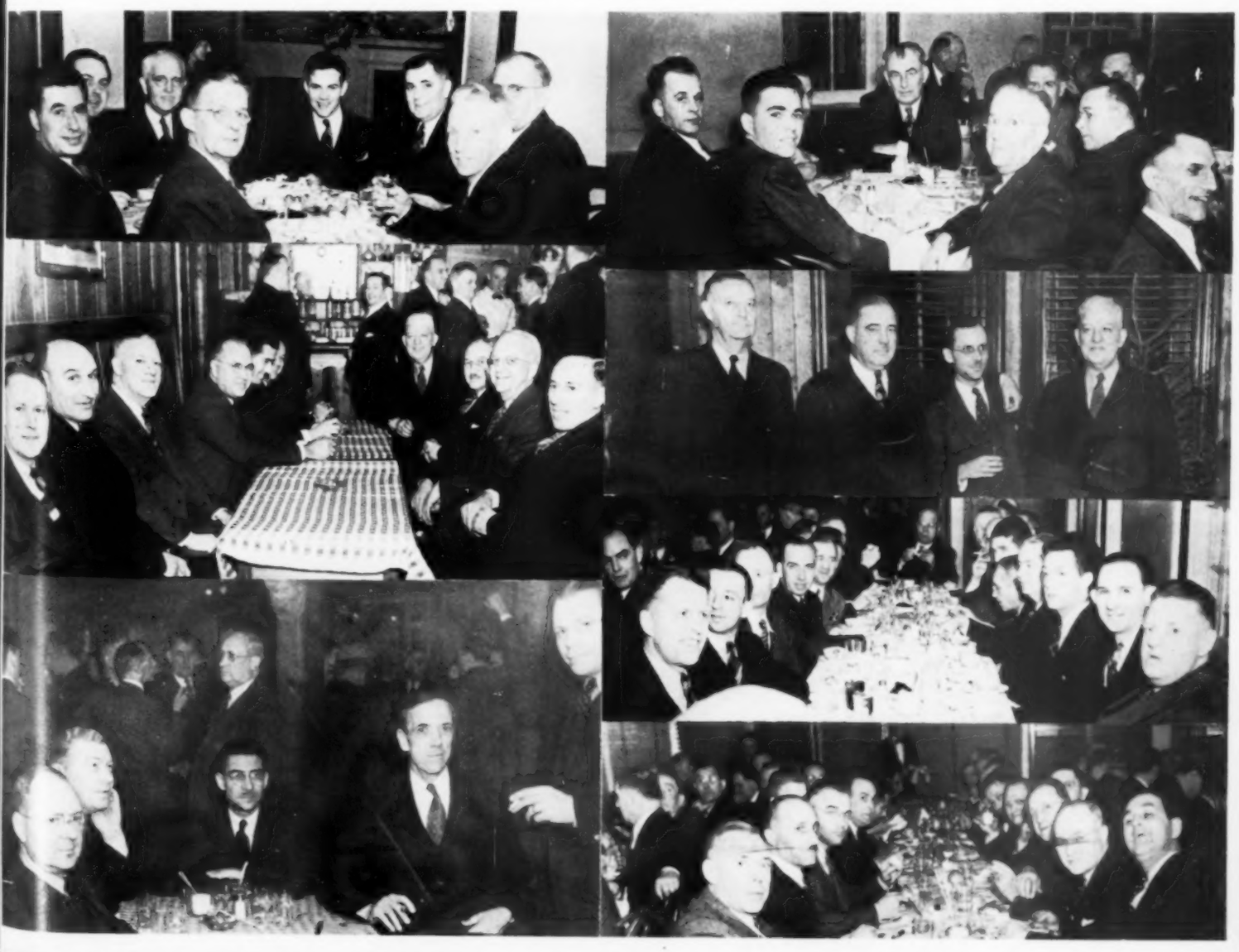
ANOTHER large attendance marked the Jan. 10 meeting of the Philadelphia chapter of the A.F. A. held at the Engineers club. One hundred thirty-two members and friends listened to one of Uncle Sam's foremost *G* men, J. F. Sears, in charge of Philadelphia district, tell of the workings of the federal bureau of investigation. Lee Harris introduced the speaker and then turned the meeting over to Harry Reitinger, vice chairman of the chapter, who presided in the absence of Roger Keeley, chairman.

Dr. Norman E. Woldman, chief metallurgical engineer, Eclipse Aviation division of Bendix Aviation Corp., Bendix, N. J., presented a paper on, "Castings in the Aviation Industry." He stated that the constant demand through the development of the aircraft industries has been for stronger and lighter alloys. Aluminum, next to magnesium, is the lightest of the commercially used metals and when alloyed with other elements, it becomes most suitable for use in aircraft. Aluminum casting alloys might be classed into four groups: Sand castings; permanent mold castings; diecastings; plaster of Paris mold castings. These alloys could be subdivided further into those capable of being heat treated and those which cannot be so treated. That is, one in which heat treatment processes are used to enhance further the mechanical properties; and the other in which the improvement in properties is accomplished by alloying alone.

Sand molds are used for large or for intricately cored castings. Because a metal mold or steel die is required, use of die and permanent mold castings can be considered only where a sufficiently large number of castings of the same pattern will be used. The diecasting process is particularly adapted to the quantity production of relatively small castings in which close dimensional tolerances are required. Plaster of Paris mold castings are similar to sand castings, but with smoother surface and closer tolerances. Dr. Woldman's paper covered the years of research in the development of the various percentages of copper and aluminum, silicon and aluminum, magnesium and aluminum, and copper-silicon-magnesium alloys, and how each one must be considered and used wherever these alloys show superior characteristics to be almost universally adopted in this fast growing industry. Improvement in many ways will follow present accelerated conditions.

The paper was received in a most acceptable manner as evidenced by the discussion that followed which was led by the technical chairman, Dr. G. H. Clamer.—*J. T. Fegley, chairman, publicity committee.*

Philadelphia Chapter's Christmas party was highly successful with over 230 members and guests present



N. Ill.-S. Wis.

REGULAR monthly meeting of the Northern Illinois-Southern Wisconsin Chapter of the A. F. A. was held Jan. 14, at Hotel Faust, Rockford, Ill. The meeting was conducted by P. A. Paulson, chairman of the chapter, and the speaker of the evening was Elmer J. Carmody, Charles C. Kawin Co., Chicago, who very ably presented a discussion of heading and gating gray iron castings. A general introduction dealing with the purpose served by heads and gates led to a more specific discussion of types used. General types of skimming arrangements for getting clean iron into the casting were illustrated by slides. Pictures of castings using successfully the less common types of feeding heads also were shown.

The regular monthly meeting of the Northern Illinois-Southern Wisconsin chapter of the A. F. A. was held Feb. 11 at Hotel Faust, Rockford, Ill., Chairman P. A. Paulson, presiding. About 50 were present to hear the speaker, A. L. Armantrout, talk on, "Apprentice Training." Mr. Armantrout, superintendent of industrial relations at the South works, Carnegie-Illinois Steel Corp., gave a well prepared paper on the necessity for apprentice training, the history of the changes in the apprentice system in the past century, and the various points to consider in setting up an apprentice course in the shop. He also presented in detail the outline of the training course used for foundry apprentices at the South works.

Next meeting of the chapter will be held March 11 at Hotel Faust, Rockford. The speaker will be Fred Sefing, International Nickel Co., New York, and his subject, "The Influence of the Conditions of the Molten Metal on the Soundness and Properties of Castings."—*J. R. Cochran, technical secretary.*

Chicago

LATEST developments in foundry equipment were described and illustrated by slides or motion pictures at the biennial "Equipment Night" program of the Chicago chapter of the A.F.A., at the Chicago Towers club, Feb. 10, with more than 200 members and guests attending.

Eight speakers, representing as many manufacturers, discussed briefly recent improvements made in foundry equipment, this ranging from materials handling machinery, through molding machines, mold and core drying ovens, melting furnaces, and casting cleaning equipment. James Thomson, chief plant engineer, Continental Roll & Steel Foundry, East Chicago, Ind., was chairman of the committee arranging the meeting and introduced the speakers.

Topics and respective speakers were as follows: "Conveyors in the Foundry," by H. L. Purdon, Link-Belt Co., Chicago; "Ladle Handling Developments," by W. J. Knappe, Modern Equipment Co., Port Washington, Wis.; "Use of the Automatic Rocking Electric Furnace in Brass and Iron Foundries," by A. E. Rhoads, Detroit Electric Furnace division, Kuhlman Electric Co., Bay City, Mich.; "Recent Developments in Molding Machines," by O. F. Weiss, Milwaukee Foundry Equipment Co., Milwaukee; "Centrifugal Casting," by Nathan Janco., Centrifugal Casting Machine Co., Tulsa, Okla.; "Recirculating Ovens," by A. E. Maehler, Paul Maehler Co., Chicago; "Lowering Costs by Increasing Production in Blast Cleaning," by A. L. Gardner, Pangborn Corp., Hagerstown, Md.; and "Recent Developments in Air Compressors," by J. Y. Richards, Sullivan Machinery Co., Michigan City, Ind.

R. W. Jennings, foundry superintendent, John Deere Tractor Works, Waterloo, Iowa, will address the chapter's March 10 meeting on "Rigging and Molding Equipment." Annual Ladies Night program is scheduled for April 18 at the Chicago Towers club.—*Erle F. Ross.*

S. California

APPRENTICE training was discussed by Victor J. Hydar, industrial relations staff, Lockheed Aircraft Corp., Alhambra, Calif., at the Nov. 19 meeting of the Southern California chapter of the A. F. A., held at Hotel Hayward, Los Angeles. "Sinews of Steel," a sound motion picture produced by the Bethlehem Steel Co., picturing various phases of wire rope manufacture from the ore to the finished product, also was shown at the meeting.

Fourth annual Christmas hi-jinx of the Southern California chapter was held at the Lakewood Country club, Friday, Dec. 13, and was attended by more than 300 members and guests. A buffet dinner was followed by a vaudeville show featuring Hollywood's best talent. The entertainment committee headed by Dick Hughes did a fine job in putting on a most successful party.

The regular monthly meeting of the Southern California Chapter of the A. F. A., held at the Elks club, Los Angeles, Jan. 27, featured talks by Herbert S. Simpson, president, National Engineering Co., and vice president of the A. F. A., and H. Bornstein, director of laboratories, Deere & Co., Moline, Ill., and a director member of the A. F. A.

The meeting was attended by more than 135 members and guests. After musical entertainment, W. D. Bailey Jr. announced the results and winners of the membership contest. First prize was awarded to Theodore Linskins, Kinney Iron Works, and second prize to Jack Coffman, Los Angeles Steel Casting Co.

Mr. Bornstein announced that the chapter had been honored by the nomination of Jack Coffman, Los Angeles Steel Casting Co., Los Angeles, and a past chairman of the Southern California chapter, as a director of the A. F. A. Mr. Simpson then gave an interesting talk on, "Merchandising of Cast Metal Products," and led a general discussion which brought out many interesting points on casting sales and manufacture.

Robert Gregg, Reliance Regulator Co., presented an entertaining discussion in which he contended that he was greatly bothered by the lack of old-time skilled molders in jobbing shops. He stated that in many instances castings really are being made in the chipping room, and that it often is necessary to show the cleaning room foreman the pattern so that the casting might be identified. Bert Popperwell, Reliable Iron Foundry, agreed with Mr. Gregg on most points, but contended that even good molders no longer are allowed sufficient time to turn out good work. The old time molder made personality castings and probably could do so even today, but the buyer of castings is not interested in anything but price.

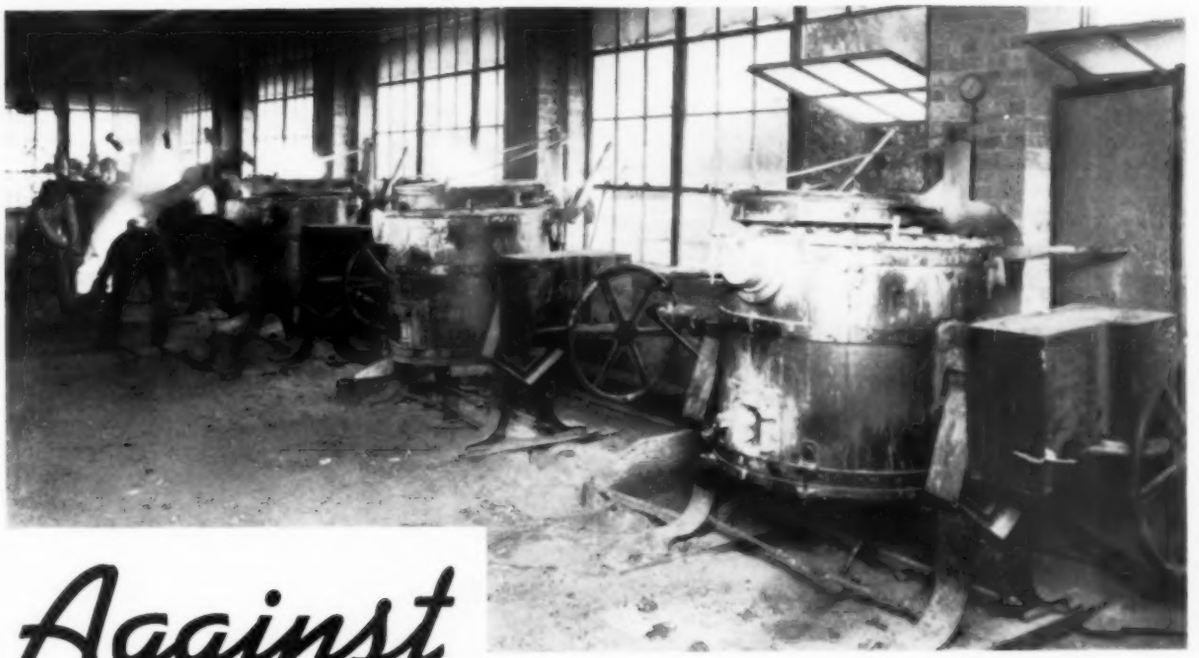
A motion picture, "Army on Wheels," was presented through the courtesy of the Chrysler Corp., and depicted the new United States army in action.—*W. F. Haggman, secretary.*

N. California

FIRST event of the Jan. 10 meeting of the Northern California Chapter of the A. F. A. was a visitation of the plant of the Vulcan Foundry Co., Oakland, Calif., where a large and enthusiastic group gathered. Sixty attended the chapter meeting which followed. After dinner current affairs of interest were discussed, particularly the meeting to be held Jan. 31 at which the vice president of the association, Herbert S. Simpson, president, National Engineering Co., Chicago, will speak. E. W. Bonstin, vice president, Pacific National Fire Insurance Co., gave a half-hour demonstration of his ability to memorize. J. W. Knappe, sales manager, Modern Equipment Co., showed a 2-reel sound movie on the use of his company's many labor

(Continued on page 86)

CRUCIBLES FOR DEFENSE . . .



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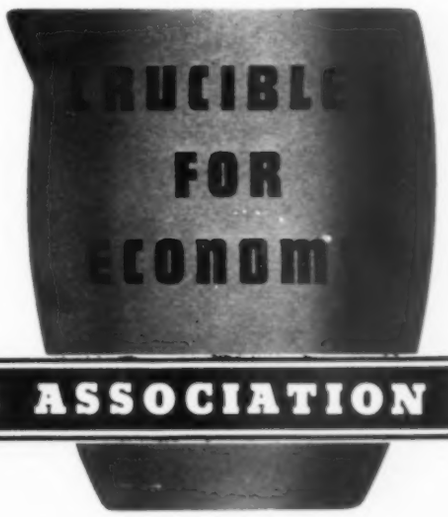

CRUCIBLE MANUFACTURERS ASSOCIATION

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REMOVED

More than 135 members and guests of the Southern California chapter were present at the regular January meeting to hear H. S. Simpson, vice president, and Hyman Bornstein, past president and director of the A. F. A.

(*Continued from page* 84)

saving devices; following which there was a question and answer period. To top the evening of instruction and good fellowship, the birthday of Ivan L. Johnson, chairman of the chapter was celebrated. Membership committee chairman, John Bermingham, unloosed his sales talent to good effect, resulting in one application for membership being taken on the spot. As a last word, everyone was urged to have his shop men attend the meetings.

A meeting in honor of Herbert S. Simpson, vice president of the American Foundrymen's association, was held Jan. 31, by the Northern California chapter. Mr. Simpson was making a tour of the Pacific coast, meeting with the two chapters in California as well as contacting foundrymen in the industrial centers of the Northwest where there are no chapters. Clarence Henderson and John D. Fenstemacher, first two chairmen of the Northern California chapter were unable to be present, but sent greetings to Mr. Simpson.

A fine turnout of members and friends were present to meet Mr. Simpson who was introduced by Ivan L. Johnson, chairman of the chapter. Mr. Simpson discussed the rapid change in national affairs and his recent visit to Washington on defense matters. He made a strong plea that we give first thought to guarding American interests, and that foundrymen do their utmost to produce better castings to meet the needs of the defense program. Mr. Simpson did not say that foundrymen were suffering from an inferiority complex regarding their product, but did say that in general there was little effort being made to hold their business and educate the public of the superiority of castings over the many methods and substitutes that are being promoted. On this point he granted there were exceptions to this lack of promotion and cited some sales promotion work that was being carried to the point of dramatizing castings which was having a wonderful effect. He implied that "'think well of yourself and others will think well of you" is a good motto for foundrymen to follow. He covered the subject of selling castings by piece and by pound, and accused the latter method as being responsible in many in-

(*Continued on page* 89)

(*Continued from page 86*)

stances for practically giving castings away. He recommended interchange of plant visits; also plant visits by customers as a means of needed education in the dependability of castings. He advocated training well prepared men for foundry salesmen who could point out to customers the folly of buying on a price basis as against quality. Some of his remarks found tender spots, which resulted in several entering into a lively and helpful discussion.

Mr. Simpson complimented the chapter (of which he is the accepted godfather) on its sturdy growth, strongly recommended more company memberships in order to make more $8 personal memberships available to shop men who are in training and need help; and spoke of the advantage of foundry fraternalism which the chapters fostered. Past and present officers joined with the membership in thanking Mr. Simpson for his visit.—*George L. Kennard, secretary-treasurer.*

New Jersey

EFFECT of the cooling rate on properties of gray iron was the main theme of a discussion before the New Jersey Foundrymen's association in Newark, N. J., recently, which developed into a consideration of many phases of foundry practice, including some recent interesting observations with regard to by-product coke, the use of low and high phosphorus irons, and the relation of iron to scrap in the melt. W. O. McMahon, chief foundry metallurgist, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., was the principal speaker. John L. Carter, secretary, discussed briefly the legislative outlook in New Jersey and other matters of local interest to the foundrymen.

To produce iron of good machinability, Mr. McMahon emphasized the importance of an adequate cooling period between pouring and shakeout, which gives the iron an opportunity to anneal properly in the sand. He cited one case where unsatisfactory castings developed in a new plant because the conveying facilities did not provide a sufficient cooling period. A check showed that about 2 minutes were being allowed. Later facilities were installed which provided more than double that length of time in the conveying of castings between the pouring and shakeout department, with a result that excess hardness of the castings was eliminated. The speaker listed several points which effected the cooling rate, including the initial temperature, final temperature, specific heat of the metal, volume to be cooled, and the entire surface area.

Questioned concerning the use of northern and the higher phosphorus southern iron, the speaker stated that either iron or a mixture of both easily could be made to serve the requirements by the proper balancing of the other chemical elements. A reduction in the silicon was suggested in some cases to offset an increase in the phosphorus. For instance, he cited one mixture of 3.10 per cent carbon, 2.60 per cent silicon and 0.20 per cent phosphorus. The latter could easily be raised to 0.35 or 0.40 per cent phosphorus by a reduction in the silicon to around 2.35 to 2.40 per cent, he said.

Commenting on the relative use of pig iron and scrap, Mr. McMahon said that up to a certain point it was an economic problem, depending upon the supply and in turn the prices of the materials. However, he believes that in general a charge of 50 to 65 per cent pig iron is the most satisfactory. Pig iron charge under 30 per cent, in his opinion, is almost sure to bring trouble and he believes that the exclusive use of either pig iron or scrap is undesirable.

Among miscellaneous observations, Mr. McMahon said that chromium was best for reducing growth. One per cent chromium is satisfactory for temperatures ranging around 1250 degrees and 0.60 to 0.70 per cent on temperatures around 900 degrees Fahr. He also devoted some discussion to the production of grids and piston rings, stressing the importance of proper gating in the relief of strains in thin sections generally.—*B. K. Price.*

Detroit

IN SHARP contrast to foundry technique common to the Detroit area is the practice followed by the Lynchburg Foundry Co., Lynchburg, Va., which was described to 60 members and guests of the Detroit Chapter of the A.F.A. at the Jan. 16 meeting by Max Kuniansky, general manager of that company. Guests of the chapter were C. E. Hoyt, executive vice president of the A.F.A. and Frank G. Steinebach, editor of THE FOUNDRY.

Mr. Kuniansky had an engaging style of presentation and held the interest of his audience constantly with unusual details of operations in his foundry. Because of the distance of the foundry from pig iron production centers, it is the policy to use high-scrap mixtures in cupolas, in some cases 100 per cent scrap being charged. Typical burden for iron to be used in centrifugal pipe casting work comprises 4400 pounds of metal charge, mostly scrap, with 400 pounds of coke. The latter included 320 pounds of beehive and 80 pounds of queen-bee pitch coke. Carbon content of the latter is 98.5 per cent and serves to bring total carbon content of the iron up to 3.60 per cent.

Desulphurizing is done in the ladle with soda ash and late additions of ferrosilicon and zirconium silicide are made to scavenge the iron thoroughly. Twenty per cent of the ultimate silicon content of the iron is added in the form of 75 per cent ferrosilicon and 40 per cent zirconium silicide. Silicon content ranges from 0.075 to 0.125 per cent.

Mr. Kuniansky elaborated to some extent on this *soul cleaning* of the iron, as he termed it, an essential step because considerable machining must be done on some castings and a portion of the scrap charged is not of the highest grade.

In addition to centrifugal pipe, the two foundries of Lynchburg make a wide assortment of ells, tees, fittings and connections for large pipe systems, kettles and retorts for the chemical industry, plows and a variety of larger-size miscellaneous castings.

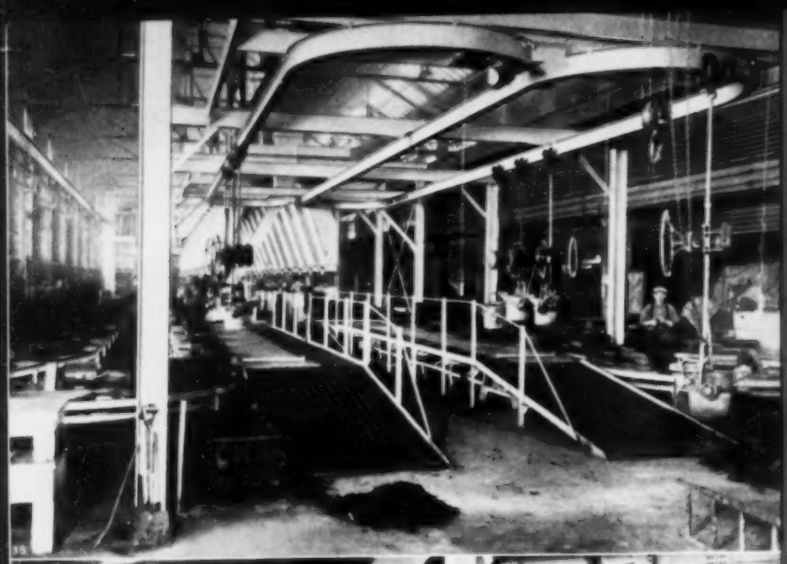
Technical control problems are many in this practice, and technicians make continuous tests on analyses, physical properties, chills, sand and similar details. One most unusual feature of the Lynchburg technique, at least to automotive-minded foundrymen, is the use of low pouring temperatures and elimination of risers on many castings. Mr. Kuniansky cited a number of job histories on which pouring temperatures averaged around 2300 degrees Fahr. One of these was a large kettle for handling caustics, about 10 feet in diameter and several inches thick. To insure low phosphorus content, 100 per cent steel scrap was melted in a cupola, the metal pigged then charged back in the cupola again with pitch coke to bring up the carbon content and alloy additions made to produce a sort of synthetic iron.

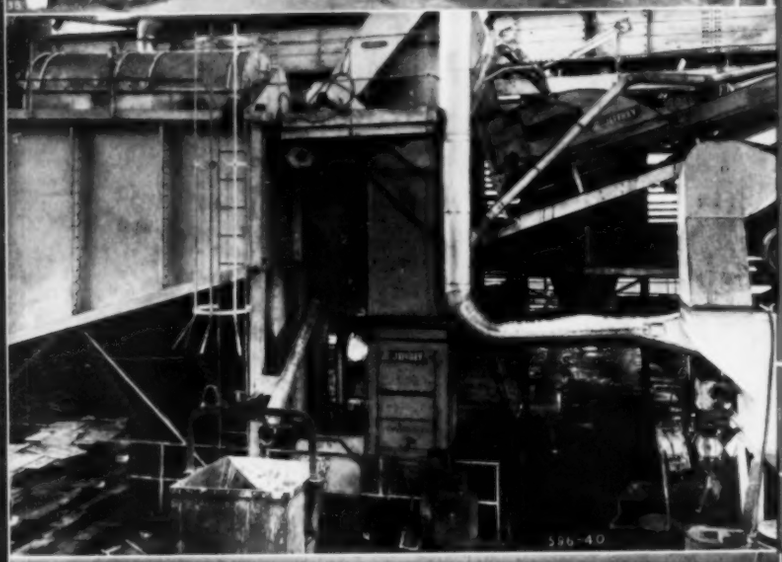
Mr. Kuniansky was at his best in the repartee which developed during the discussion period. He left no doubt of his ability to adapt peculiar conditions to the profitable production of high-grade castings.—*A. H. Allen, secretary.*

Chesapeake

CHESAPEAKE Chapter of the A.F.A. held its first annual Get-Together party on Jan. 17, at the Lord Baltimore hotel. Approximately 200 foundrymen from the Chesapeake area attended and thoroughly enjoyed a buffet supper and floor show. The entire party was con-

(*Continued on page 92*)





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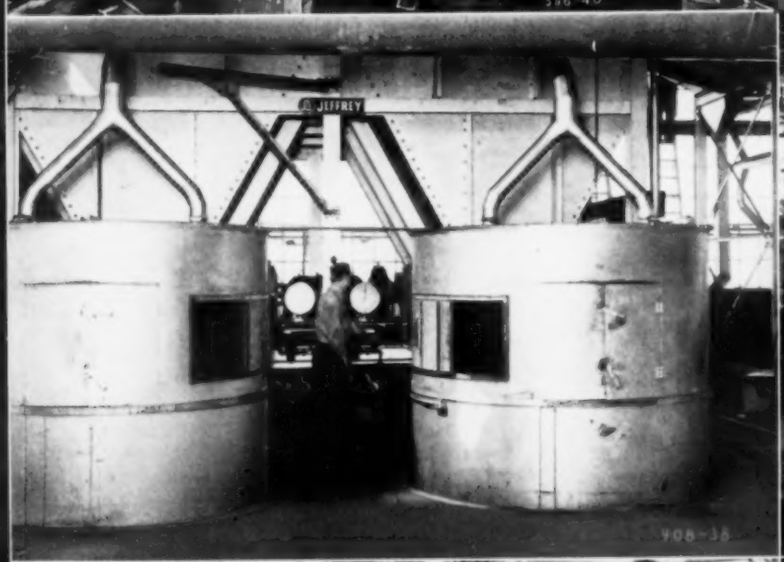

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(*Continued from page* 89)

ceived, planned, and executed by the entertainment committee, consisting of the following: L. H. Denton, chairman, W. D. Bourquin, C. L. Elgert, H. E. George, A. A. Hochrein, R. F. Willey, and H. M. Witmyer. It was the unanimous opinion of all who attended that the party was an outstanding success and that the next one could not come too soon. During the party, Chairman Horlebein presented to R. T. Covington chairman of the membership committee, the bell used for calling meetings to order, which is the trophy presented to chapters having secured the largest number of members each month during the period of the membership campaign. This bell was won by the Chesapeake chapter for securing the greatest number of members during November and December.—*L. H. Denton, secretary.*

Western N. Y.

THE February meeting of the Western New York Chapter of the A. F. A. held at the Touraine hotel, Buffalo, Feb. 7, brought out a splendid attendance from all over the district. Weather and driving conditions were atrocious, and it was distinct tribute to our guest speaker, Vincent T. Malcolm, director of research, Chapman Valve Mfg. Co., Indian Orchard, Mass., that so many district members drove or traveled from 30 to 150 miles to be in attendance.

Following a moment of silent tribute to the passing of one of our old members, Harry J. Strassberger,

(*Continued on page* 94)

Chesapeake chapter holds its first annual Get Together. Photos courtesy of Frederick G. Bruggman, Gibson & Kirk Co., Baltimore

SPEED IS NEEDED TO MEET DEFENSE PRODUCTION

No. 2 OF A SERIES

Speed, Speed, Speed is absolutely essential to meet the defense production schedule. However, speed alone is not the answer. *Speed plus* precision is the real answer to our defense production problems.

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Shown above is a battery of Herman Jarr Squeeze Machines making miscellaneous snap flask work in a modern steel foundry. Herman Jarr Squeezers are not flimsily constructed by fabrication but like all Hermans are built of sturdy castings so they will last. They are constructed to take the beating they must face on production work.

Hermans are modern. The Squeeze Head is perfectly balanced. A touch drops the head down to squeeze position and it automatically locks. It is just as easily flipped back. Extra long cylinder and plunger assures perfect guiding and minimum wear.

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Enter your request for a consultation with an experienced Herman foundry engineer. Your problems are his and with your help and his experience they soon will be solved. You, of course, are not obligated in any way and he will call at his earliest convenience.

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

(*Continued from page 92*)

The feature of the evening was preceded by the presentation of the new American League baseball film, showing the stars in all branches of the past time in action. The prominence given to Bob Feller perhaps showed in a measure why he is paid $30,000 a year for a little pitching, while we fellows in the foundry industry are only guaranteed 30 cents an hour for hitting the ball.

Vincent T. Malcolm's talk on steel castings was really expanded to cover gray iron and nonferrous, and pointed the way to better castings, lower loss ratios, and final profit to those in a position to avail themselves of the tremendous knowledge of such research engineers as Mr. Malcolm himself and which is so freely given without a selfish thought through participation in A. F. A. and its activities.

March 7 meeting will be held at the Touraine hotel. Herbert S. Simpson, president, National Engineering Co., Chicago, and vice president of A. F. A. will be the guest speaker. Subject of Mr. Simpson's talk will be, "Marketing of Cast Metal Products."—*Eliot Armstrong, secretary.*

Twin City

FIRST meeting in 1941 of the Twin City Foundrymen's association, was held Jan. 20 at the St. Anthony Commercial club, Minneapolis. A buffet supper was served at 6:30 p. m. to 43 members and guests. C. W. Johnson, district representative of the United States department of labor, gave a brief talk on the apprenticeship program as sponsored by the federal and state governments. He urged the foundrymen to select a committee to look into the matter with the idea of formulating a more definite and uniform plan than now exists. The main speaker of the evening was James Vanick, International Nickel Co., New York, who talked on "Engineering Properties of Cast Iron," which he illustrated with slides.

Pointing out that specifications developed and adopted during the past 20 years have given the engineer and the foundryman a common and universal measuring stick, he claimed that a great deal of work still remains in an effort to correlate the results of many forms of tests. In a general way there is a relationship between tensile, transverse and other tests, but it is not definite. In developing his theme he referred to practically all types of test bars and methods of testing tensile, transverse, hardness, torsion, shear, damping capacity, fatigue, impact. He emphasized the necessity of extreme accuracy in conducting the tests, since an apparently trifling detail might throw out the entire calculation or comparison. He outlined typical compositions, chemical and physical properties of a wide range of castings and directed attention of the fact that a similar composition shows marked difference in physical properties when poured into a thin or thick section. A short open discussion followed the lecture.—*O. W. Potter, secretary.*

Central Indiana

APPROXIMATELY 75 members and guests attended the Feb. 3 meeting of the Central Indiana Chapter of the A. F. A., held at the Washington hotel, Indianapolis. I. R. Wagner, Electric Steel Castings Co., and chairman of the chapter, presided. J. A. Kayser, chief refractory engineer, Laclede-Christy Clay Products Co., St. Louis, was the principal speaker and his subject was "Foundry Refractories." Mr. Kayser discussed the manufacture and application of refractories for the foundry industry, illustrating his talk with slides which showed the various operations in the production of refractories. A good discussion followed his informative and practical talk.

March meeting of the chapter will be held at the Washington hotel, March 3, with A. H. Dierker, research engineer, Globe Iron Co., Jackson, O., discussing "Cupola as a Foundry Tool," and W. B. George, foundry engineer, R. Lavin & Sons, Chicago, who will talk on "Gates and Risers for Nonferrous Castings."—*R. A. Thompson, secretary.*

St. Louis

ST. LOUIS District chapter of the A.F.A. enjoyed its first "Equipment Night" on Thursday, Feb. 13, held at the DeSoto hotel with approximately 175 foundrymen and friends present to listen to the various equipment speakers describe their wares. Each speaker was allotted 15 minutes and promptly at the end of his time was stopped by the ringing of a bell and the applause of the audience. Quite a bit of information was given by the various speakers and a lot of fun was had during the evening.

Speakers and their subject were as follows: E. R. Huckman, branch manager, St. Louis office, Foxboro Co., Foxboro, Mass., "Air Measurement and Control as Applied to Gray Iron Foundries and Steel Mills"; A. W. Gregg, foundry engineer, Whiting Corp., Harvey, Ill., "Mechanical Charging for Cupolas"; C. A. Snyder, American Foundry Equipment Co., Mishawaka, Ind., "Wet Dust Collector in the Foundry Industry"; Lester B. Knight, sales manager, National Engineering Corp., Chicago, "Simpson Mixers"; A. E. Hilliard, M. A. Bell Co., St. Louis, "Safety Equipment."

Following dinner an additional group of about 25 to 50 came making probably the largest attendance at any regular meeting during the year. The entire group then retired to various rooms throughout the hotel where equipment men had displays. During the course of the evening several new members were welcomed into the chapter. It was also pointed out that the date happened to be the fiftieth birthday of Emil Goerger, former secretary of the chapter. Chairman Carter Bliss also mentioned the much-regretted leaving of Lee E. Everett, a former chairman of the chapter, for Kaukauna, Wis.—*J. W. Kelin, secretary-treasurer.*

Ontario

A NEW attendance record of over 140 marked the Jan. 31 meeting of the Ontario Chapter of the A. F. A. at the Royal York hotel, Toronto, presided over by Chairman D. M. Storie, Fittings Ltd., Oshawa. A number of factors were responsible for the large attendance, steadily growing interest in chapter activities, vital importance of gating problems, opportunity to present individual gating problems, and the presence of Pat Dwyer, THE FOUNDRY, as discussion leader. Vice Chairman N. B Clarke, Steel Co. of Canada Ltd., had a number of slides prepared showing typical castings in which a change in gating methods cleared up former troubles. A brief entertainment program was presented in advance of the technical session. The general and practical discussion showed that it is almost impossible to set down definite rules for gating castings properly.

Proper gating for a new job in many instances depends on practical knowledge and wide experience. J. C. Stavert, Babcock-Wilcox and Goldie-McCulloch Ltd., submitted a drawing showing a 660-pound iron casting containing 1.00 per cent nickel, 0.30 per cent chromium, 3.55 per cent total carbon and 1.50 per cent silicon. Gated and risered in the usual manner, the first casting developed a shrinkage crack ½-inch wide and 3 inches in length. Trouble finally was eliminated by providing a gate at the top and four 4-inch risers approximately 14 inches high. D. J. Macdonald, Standard Sanitary & Dominion Radiator Ltd., showed

(*Concluded on page 96*)

Coleman TOWER Ovens

Coleman Tower Core Oven with Oil-Fired Recirculating Heating System—at Chicago Malleable Castings Co., Chicago, Ill.

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CORE AND MOLD OVENS

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(*Concluded from page 94*)

how a change in gating overcame dirt wash and scabbing in a boiler casting gated originally at the center. The new gate fed into the mold through 11 openings from a runner extending almost halfway around the circumference. A. B. Bock, Sheldon's Ltd., showed a small shaft coupling in which dirt and shrinks around the ⅞-inch center core generally were found at an angle of about 90 degrees from the gate entrance. The problem aroused extended discussion.

Joseph Sully, Sully Brass Foundry Ltd., showed a 300-pound aluminum casting which caused a great deal of trouble until metal was poured through a number of small pop gates distributed over the top surface. These gates carried the metal rapidly to all parts of the mold. A gear casing made by the Cockshutt Plow Co., originally was gated at the parting line with unsatisfactory results. This problem was solved by placing a ram-up core with ten small gate holes on the top of the casting. John Reid, Canadian Westinghouse Ltd., contributed an item which added weight to the general argument for bringing metal into the mold at a number of points. In the old method two cast iron gear boxes were cast in one flask and fed from five gate openings along the inner edge of each. Production trouble was encountered along the outer edges. In the new method the gear boxes are cast singly through three gates on each side. A similar problem and solution featured the casting of motor end shields. A. B. Russell and W. J. Brill, Canadian General Electric Co. Ltd., described several methods tried to eliminate slag inclusions and burned patches at the gate. Finally a skim bar was fastened across the pattern plate halfway between the two patterns. A piece of ¼-inch brass was fitted inside the rim of the pattern. This was fastened to the drag side of the plate and allowed the metal to flow gently up over the bell.—*G. L. White, secretary-treasurer.*

Cincinnati

PRESIDENT L. N. SHANNON, Birmingham, Ala., and Executive Vice President C. E. Hoyt, Chicago, attended the meeting of the Cincinnati Chapter of the A. F. A., Feb. 11, in the Metropole hotel. Approximately 60 members heard President Shannon review the impressive history and accomplishments of the American Foundrymen's association since inception 40 odd years ago. He pointed out the advantages if not the actual necessity for foundrymen to become members of the association. Mr. Hoyt's remarks in a light and humorous vein covered experiences at foundry conventions dating back to 1899.

The Modern Equipment Co., Port Washington, Wis., presented a sound motion picture program showing the development and progress in technique and equipment for pouring molten metal.

Technical speaker of the evening, Dr. C. O. Burgess, Union Carbide & Carbon Co., New York, presented a paper on "Effect of Alloy Additions to Cast Iron." Through slides the presentation of the paper was illustrated by data, charts and photograph reproductions which showed how the addition of various elements either singly or in combination changed the chemical composition and resulting physical properties of the castings.—*Henry M. Wood, secretary.*

N. E. Ohio

SECOND meeting in the new year of the Northeastern Chapter of the A. F. A., held Feb. 13 in the Tudor Arms, welcomed National President Lester N. Shannon, Stockham Pipe Fittings Co., Birmingham, Ala., and Executive Vice President C. E. Hoyt, Chicago. In addition to Chairman Ray Fleig, Smith Facing and Supply Co., and Vice Chairman F. J. Dost, Sterling Foundry Co., Wellington, O., four former chapter chairmen, F. G. Steinebach, THE FOUNDRY; B. G. Parker, Youngstown Foundry & Machine Co., Youngstown, O.; L. P. Robinson, Werner G. Smith Co., and E. F. Hess, Ohio Injector Co., Wadsworth, O., sat at the same table with B. D. Fuller, Whitehead Bros. Co., past president; H. S. Hersey, C. O. Bartlett & Snow Co., and Fred Walls, International Nickel Co., New York, present members of board of directors, A. F. A.

Technical speaker of the evening was James S. Vanick, International Nickel Co., New York, who presented a highly interesting lecture illustrated with a number of slides on the "Engineering Properties of Cast Iron." Although the adoption of specifications grading cast iron on the basis of tensile strength, he stated, is one of the outstanding achievements in cast iron metallurgy during the past 20 years, these specifications supported jointly by the A. S. T. M. and the A. F. A. do not answer all the requirements of the engineering trades. For example, there are a dozen ways to meet a No. 40 strength specification and the resulting castings will be tough, stiff, open grained or hard, unmachineable or too soft. These deficiencies can be remedied by defining the composition desired which helps to etablish the combination of related properties required in the casting.

The speaker pointed out that in a general way a relationship exists between tensile, transverse and other tests, but it is not definite. In developing his theme he referred to practically all types of test bars and methods of testing, tensile, transverse, hardness, torsion, shear, damping capacity, fatigue and impact. He emphasized the necessity of extreme accuracy in conducting the tests since an apparently trifling detail might throw out the entire calculation.—*Pat Dwyer.*

Metropolitan Group Plans Lectures

Metropolitan chapter of the American Foundrymen's association will begin the second series of its educational program in March. The series will comprise four lectures which will be given in the auditorium of the Essex county vocational school, Newark, N. J., under the general direction of Dr. N. E. Woldman, chief metallurgist, Eclipse division of the Bendix Aviation Corp., Bendix, N. J., chairman of the educational committee. The first series was held last fall.

The first lecture will be Wednesday evening, March 12, with Sam Tour, vice president, Lucius Pitkin Inc., New York, speaking on "Copper Alloy Castings." He will discuss both sand and die castings with reference to their physical and chemical properties, and comment on various defects and their causes.

Dr. Woldman will speak the following Wednesday evening, March 19, on "Light Alloy Castings," with special reference to aluminum and magnesium castings as produced in sand, die and permanent molds.

On Wednesday evening, March 26, Fred G. Sefing, research and development department, International Nickel Co., New York, will discuss "Ferrous Alloy Catsings." He will comment on gray iron, white castings, malleable castings, special alloy irons and cast steel.

R. J Allen, chief metallurgist, Worthington Pump & Machinery Corp., Harrison, N. J., will deliver the concluding lecture on Wednesday evening, April 2, on "Castings Versus Forgings Versus Welded Built-Up Sections."

Officers Elected

Propeller Fan Manufacturers association recently elected the following officers: E. W. Petersen, American Blower Corp., president; A. R. Stephan, DeBothezat, Ventilating Equipment Division, vice president; V. C. Shetler, Detroit, secretary-treasurer.

Comment

PERHAPS many have failed to realize the enormous contribution which the Industrial Hygiene Codes committee of the American Foundrymen's association has made toward the improvement of working conditions of the foundry industry. Leading authorities in industrial hygiene work and government officials concerned with safety and health problems, all agree that the work of the A.F.A. committee has been outstanding, and that probably no other industry has shown more progress in correcting the situation resulting from the nature of the process and the types of materials employed.

Recently, in directing attention of the industry to the work of the Industrial Hygiene Codes committee, E. O. Jones, director safety and hygiene section of the A.F.A., referred to a paper presented some 9 years ago at a management meeting. This paper concluded as follows: "We have been challenged with a serious problem, and the most effective way in which to meet this challenge is through prevention and control — prevention of conditions which are contributing to the contraction of silicosis, and control of such conditions as may encourage or augment it; in other words, good housekeeping should and must be our earnest endeavor at all times."

Good housekeeping has been the motivating force in guiding much of the work of the committee, and has resulted in the formulation and adoption of the following safety and hygiene codes: Tentative Code of Recommended Practices for Testing and Measuring Air Flow in Exhaust Systems; Tentative Code of Recommended Practices for Grinding, Polishing and Buffing Equipment Sanitation; Tentative Recommended Good Practice Code and Handbook on Fundamentals of Design, Construction, Operation and Maintenance of Exhaust Systems; Code of Recommended Good Practices for Metal Cleaning Sanitation; and Code of Recommended Good Safety Practices for the Protection of Workers in Foundries.

These codes are available through the American Foundrymen's association at a very reasonable cost and should be used constantly by the management of every foundry in the United States as a guide to better practices in foundry housekeeping. Sooner or later every plant will be confronted with problems which may be solved through the application of this information.

In addition to the work on the codes, Chairman J. R. Allan and the other members of the committee have contributed much in time, effort and money to extend help in the formulation of new state codes, and the work already done along that line should be of considerable assistance to other state groups working on the same problem.

The entire foundry industry is indebted greatly to the individual members of the committee and the companies with which they are connected for this definite contribution to the welfare of the industry. Complete utilization of the material presented in the codes is an excellent way in which to discharge a portion of this obligation.

— □ —

Experimental work being done in the United States with regard to the production of cast shells, recently was questioned in the following letter which appeared in the Jan. 9, 1941 issue of the *Foundry Trade Journal*:

> The editorial article in the November issue of your American contemporary, THE FOUNDRY, includes this sentence: "Both regular and educational orders for shell and ammunition parts are being cast in gray iron for both British and American Governments."
>
> We are surprised to read this, as we are under the impression that a good many gray iron foundries in England are not fully occupied. We realize that many factors are involved about which we can know nothing, but it seems curious that American exchange should be used in buying iron castings, unless our own productive capacity is fully employed already.

— □ —

The Gray Iron Founders' society has been doing an excellent job in representing the foundry industry in the controversy which has arisen over the allocation of scrap rails. A move on the part of the rerolling industry, which appears to have had the backing of certain officials in the scrap industry, would divert much of the present supply of scrap rails to rerollers. Since it appears that scrap rails have become an essential part of the charge in a considerable number of foundries producing high grade gray iron castings, such action on the part of the defense commission in applying regulation to change the normal trend of a product of commerce would provide a serious handicap to those foundries, many of which are producing defense materials. W. W. Rose, executive vice president of the society, has held several conferences with officials of the defense commission, and the society is conducting a survey of the industry to obtain accurate data on the actual tonnage of rail scrap consumed, and the present needs.

The present situation with regard to scrap is only the beginning of a series of difficulties which will continue to confront the foundry industry as the defense program gains momentum. In all probability, the foundry industry will come off second best unless some organization constantly watches the development, and has sufficient backing, both moral and financial, to carry on the work that must be done. As I have mentioned before, the steel and malleable branches are excellently organized with almost universal support of the plants in each group. The gray iron division has an excellent organization, but the support comes from a relatively small group of progressive foundries who have realized during the past few years that the time would come when such an organization they have supported would be mandatory for the welfare of the industry. A big job remains to be done. However, little can be accomplished unless all the gray iron foundries get behind the Gray Iron Founders' society, both through membership and personal sacrifice in time and effort. Membership in a good trade association today must be considered as insurance against eventualities resulting from the complete dominance of a war economy.

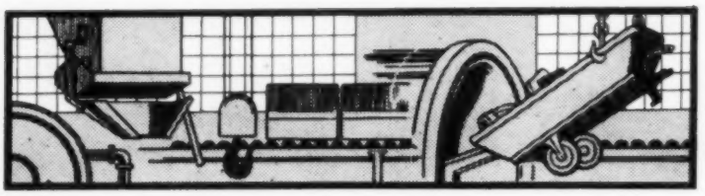
— □ —

The following simple rules have been suggested for employers seeking deferment for young men engaged in essential defense work:

1. Designate a responsible company official to handle all appeals to draft boards; do not leave this to the foreman or other lesser authority.
2. See that this man writes and signs all appeal letters using his title.
3. Do not abuse the appeal privilege; appeal only when you have a clear-cut case of legitimate deferment.

F. G. S.

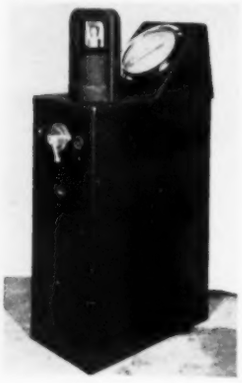
NEW EQUIPMENT



AND SUPPLIES

Briquetting Press

Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has introduced a speciman briquetting press for preparation of specimens to be placed in the spark or arc gap of



the spectograph for rapid and accurate spectrochemical analysis. The machine consists primarily of a hydraulic pressure system and a press containing the mold for forming the tablet. The heavy duty pump is connected directly to a ¾-horsepower motor. A 10-gallon oil reservoir is in the base of the machine. Pressure may be set to any predetermined value by a simple operation.

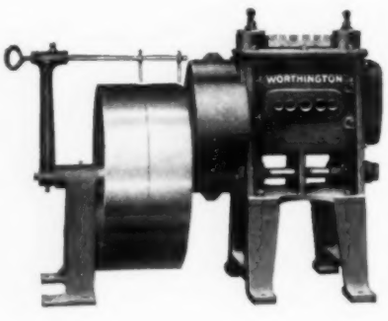
Resulting tablets will be uniform. Load is indicated on a 10-inch diameter gage. Pressure also may be controlled by hand through a by pass valve. Setting of the automatic pressure regulator need not be disturbed where the operator has a few soft samples to briquet at low pressure. Cast iron, steel and other hard materials are briquetted under a pressure of a 15,000 pound load. Soft materials, aluminum and die cast metals may be briquetted with loads as low as 4000 pounds. It is claimed that accuracy of spectrochemical analysis with briquetted tablets is equal to that obtained from cast pencil specimens. It is also pointed out that briquetting samples for spectrochemical analysis greatly extends the range of the spectrograph in industrial laboratories where samples are supplied in loose form.

Hack Saw

Millers Falls Co., Greenfield, Mass., has introduced a double edge hack saw blade. In the new blade the teeth of the first edge are set fractionally wider than those of the second. Advancement in heat treatment technique is claimed to leave teeth hard and ends and center soft.

Wire Straightener

Federal Foundry Supply Co., 4625 East 71st street, Cleveland, has acquired patterns, patent rights etc., to the core wire straightener shown in the accompanying illustration and formerly made by the Worthington Pump and Machinery Corp. The Federal Foundry Supply Co., will

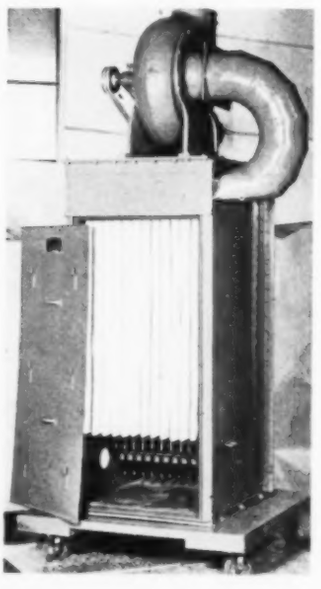


build new machines and also will supply spare and repair parts for machines now in use. Among claims set forth by the maker are that the machine is equipped with hardened high carbon steel rolls which insure long life with minimum adjustments and repairs. All working parts are enclosed, wearing parts are protected from dust and the operator is safe guarded from injury. Operation of the machine is so simple that unskilled labor may be employed. Rolls may be adjusted by turning down on two set screws on top. When the rolls are badly worn they may be reground and replaced. The machine is available in three sizes for handling wires within definite diameters, the first from $\frac{1}{16}$ to ¼-inch; the second from $\frac{3}{16}$ to ½-inch and the largest size from ¼ to ¾-inch diameter.

Dust Filter

W. W. Sly Mfg. Co., 4700 Train avenue, Cleveland, announces a new model dust filter designed for use as an auxiliary to larger filters or with individual machines, for example grinders which require exhausting. Mounted on a platform with rubber tired casters, as shown in the accompanying illustration, the filter readily is portable and easily may be moved from one machine to another. Very little floor space is required. The exhaust fan is mounted on the filter. The unit also is available unmounted and can be placed on the floor, against a wall, or suspended over head. Handling 1000 cubic feet of air per minute the filter is shipped completely as-

(*Concluded on page* 102)



Sterling

THE WHEELS OF INDUSTRY

Sterling Resinoid Grinding Wheels smooth out rough spots in production schedules. Foundrymen like these "wheels of industry" because they make all grinding easier, quicker, and more economicall There are Sterling Resinoid Wheels and other types, too, for every grinding operation in your plant. At no obligation, our engineers will gladly submit specifications to solve your particular problem.

• STERLING ABRASIVES •

THE
STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

(*Concluded from page* 100)

sembled including a 3-horsepower motor which operates at 1800 revolutions per minute. The filter contain special cloth bags which thoroughly clean the dust laden air. The bags are shaken by a shaker handle on right side of exterior to remove the clinging dust.

Lift Truck

Barrett-Cravens Co., 3250 West 30th street, Chicago, recently has placed on the market a new ball bearing lift truck capable of handling loads up to 1000 pounds with or without skids. The upper frame is covered with a sheet metal deck. Platform heights of the new truck are 3½, 6, 7 and 9 inches. It is claimed the 3½-inch height is an innovation in the lift truck field. The trucks are available in one width, 18 inches, and with a full lift of 2 inches.

Timer

R. W. Cramer Co. Inc., Centerbrook, Conn., has introduced an interval timer designed primarily for the control of industrial equipment which can be timed automatically. The device is applicable to mixers, tumbling barrels, heat treating furnaces, and other uses in which timers may be subjected to excessive moisture and dust. A standard self starting synchronous motor driven interval timer is enclosed in a special dust tight and splash proof cast aluminum housing arranged for conduit connection and provided with a full vision window and external setting knob. Front view bull's eye light signals are available at slight extra cost. The timer is available in 12 different scales, from one revolution in 15 seconds to one revolution in 24 hours.

Water Drain

DeVilbiss Co., Toledo, O., recently has placed on the market a new automatic water drain for use in compressed air lines. The drain, available with four fitting assemblies, can be installed in air lines, on air compressing outfits or air receivers. The device eliminates the necessity of daily hand draining and provides positive protection against carelessness, over sight on the part of operators, or unusual atmospheric conditions. The drain is operated automatically by a slight fluctuation of the main air line pressure. Variation of as little as 5 pounds is sufficient. A manually operated drain is provided for use in periods when the main air line is not in use. Installation of the drain is comparatively simple. All the copper tubing, hand valves, brackets and connections are included in each of the four fitting assemblies.

Battery Holder

Edison Storage Battery division of Thomas A. Edison Inc., West Orange, N. J., has developed a new, demountable steel compartment for industrial truck batteries. The device permits quick change of entire unit, including battery and provides secure attachment to the truck.

Fire Fighting Unit

Walter Kidde & Co. Inc., Bloomfield, N. J., has developed a compact fire fighting unit designed to be hooked on as a trailer for emergency use. The mobile unit, shown in the accompanying illustration, carries a battery of six 50-pound carbon dioxide cylinders equipped with hose reel and nozzle. The manifold cylinders are operated individually through valves on each cylinder. Carbon dioxide gas is discharged through 100 feet of ½-inch hose fed through a trunnion type manifold. Discharge is controlled by a valve on the nozzle handle. To cope with small fires, two portable carbon dioxide extinguishers of 15 pounds capacity are carried on the front platform of the trailer. The trailer also carries two 2½ gallon water extinguishers which operate on the principle of a siphon bottle. A small cartridge of carbon dioxide is released when the extinguisher is inverted. The resulting water stream is effective up to 30 to 40 feet.

Rust Preventives

A new series of rust preventives including liquid rust-inhibiting, nondrying products, built from a newly developed base has been placed on the market by E. F. Houghton & Co., Philadelphia. The series also includes grease-type (nondrying) products; drying, hard film products; semidrying (waxy film) and soluble rust preventives. The new basic material is said to provide a homogeneous film, noncrystalline with a high degree of cohesion as well as adhesion to metals. It wets out the surface rapidly making a nontacky, unbroken film impervious to atmospheric conditions. Products are provided to meet government and industrial specifications.

To Hold Conference At Los Angeles

Southern California Chapter of the A. F. A. is working out details with the American Society for Metals to hold a Pacific coast regional meeting for foundrymen during the Western Metals congress to be held in Los Angeles the week of May 12. Plans are being made by the following committee appointed by James Eppley, president of the Southern California chapter: Chairman Robert Gregg, Reliance Regulator Co.; Don Clark, California Institute of Technology; B. C. Emmett, Los Angeles Steel Casting Co.; W. D. Bailey Jr., Pacific Metals Co.; A. G. Zima, International Nickel Co., and chairman of the A. S. M. chapter; W. F. Haggman, Foundry Specialties Co., and secretary of the A. F. A. chapter.

The chapter is anxious to have speakers from other sections of the country. Suggestions may be directed to Robert Gregg, Reliance Regulator Co., Alhambra, Calif., or W. F. Haggman, Foundry Specialties Co., Huntington Park, Calif.

Wells Mfg. Corp., Three Rivers, Mich., manufacturer of metal cutting band saws, recently moved into a new factory on a tract of land east of Three Rivers. The new plant provides approximately 20,000 square feet of manufacturing space.

DUST the MASQUERADER

IS HE UP TO MISCHIEF IN YOUR PLANT?

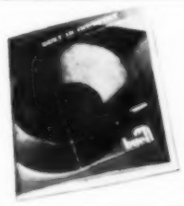
Wooden Mask,
Vancouver Island

"This mask represents a wild man of the mountains. The character appears in winter dances of the tribes. He usually acts as a medicine man, and suffers sometimes from attacks of frenzy, breaks away from other dancers and rushes about destroying property."

Indian Art of the United States

The harm that uncontrolled dust can do takes many forms . . . direct waste, the slackening of production speed, inaccuracy of delicate measurements, increased percentage of rejects. Yet, once unmasked, dust is neither difficult nor expensive to control.

The Buell Dust Technician is a trained expert who can help you to discover perhaps unsuspected ways in which dust, in masquerade, is reducing efficiency in your plant. The Buell Dust Technician is as near as your telephone. Call him, and let him tell you, without obligation, what Buell (van Tongeren) Dust Collectors have done for many of America's leading concerns. Let him show you how efficiently and economically Buell equipment can work for you.



Write for 24-page book
"DUST IN INDUSTRY"
— dust facts and
case histories.

BUELL ENGINEERING COMPANY, Inc.
14 Cedar Street, New York
Nation-wide service through offices of either Buell Engineering Co. or B. F. Sturtevant Co.

buell
DUST COLLECTORS

Obituary

CHARLES R. MESSINGER, 57, president, Chain Belt Co., Milwaukee, chairman, Oliver Farm Equipment Co., Chicago, and closely identified with several other Midwest industrial enterprises, died suddenly at his home in Milwaukee, Feb. 4. Mr. Messinger was a member of the advisory council of the ordnance department, United States army for the middle western district, and at the time of his death was actively interested in the defense program. He was born in New Haven, Conn., in 1883, and was graduated from Sheffield scientific school, Yale university, in 1906. He began his business career as a salesman for Harbison-Walker Refractories Co., Pittsburgh, and in 1909 became vice president and general manager, Sivyer Steel Casting Co., Milwaukee, becoming president in 1928 and chairman in 1931. His interests broadened during that time and he became vice president and general manager of the Chain Belt Co. in 1917, advancing to president in 1923 and chairman in 1931. He also became president of Oliver Farm Equipment Co. in 1931. Among other connections, Mr. Messinger was president, Indiana Northern railway, director of Wisconsin Bankshares Corp., Federal Malleable Co., Interstate Drop Forge Co., Milwaukee Gas Light Co., Monarch Fire Insurance Co., First Wisconsin National bank, and others. He was a member of the Milwaukee association of commerce. For many years Mr. Messinger was active in the work of the American Foundrymen's association, and was president of that organization during the year 1922-23.

* * *

Malcolm Love, 58, accountant and personnel manager, Ferro Machine & Foundry Co., Cleveland, was killed in an auto accident in that city Jan. 30.

* * *

William I. Sivitz, manager, Pittsburgh office, the Duriron Co., Dayton, O., died Jan. 30 at Pittsburgh. Mr. Sivitz had been connected with the company since 1929, and before that was associated with the Aluminum Co. of America.

* * *

William A. Nelson, 65, president, Adams & Nelson Co., Chicago, sellers of pattern supplies and machinery, died at his home in that city recently, after an illness of six weeks.

* * *

Harry J. Koch, retired former vice president, Fort Pitt Steel Casting Co., Pittsburgh, died at his home Jan. 13. Mr. Koch had been in ill health since his retirement several years ago. He is a former president of the Pittsburgh Foundrymen's association.

* * *

Charles F. Blankschaen, 76, retired general superintendent, Acme Machinery division, Hill Acme Co., Cleveland, died Jan. 17 at his home in Independence, O. Mr. Blankschaen was born in Germany and had lived in Cleveland 69 years. He retired in 1916 after 25 years with the machinery manufacturing company.

* * *

Bert L. Chamberlin, 59, representative for the Albany Sand & Supply Co., Albany, N. Y., and owner of the Paramount Sand Co., Cleveland, died Jan. 26 in Cleveland. Mr. Chamberlin was well known in the foundry industry in the Cleveland district, and had specialized in molding and banking sands since coming to Cleveland from Toledo, O., 25 years ago. He was an active member of the Northeastern Ohio Chapter of the A. F. A.

* * *

Edward P. Connell, 56, secretary-treasurer and general manager, Falk Corp., Milwaukee, died Feb. 8 after a short illness. Mr. Connell had been with the Falk Corp. for 28 years, starting as an accountant in 1913 and later serving as purchasing agent and comptroller. He was appointed treasurer of the firm in 1939 and was named general manager in March, 1940. He was also a director of the company. Before joining the Falk Corp., he was connected with the Lake Shore Engineering Co., Marquette, Mich. for 10 years.

* * *

Phillip G. De Bruyne, 56, superintendent, Moline Malleable Iron Co., St. Charles, Ill., died Feb. 8 in Geneva Community hospital, Geneva, Ill. He was a member of the malleable division advisory committee and round table conference committee of the A. F. A., and active in the technical work of the Malleable Founders' society. Mr. De Bruyne also was a director of the St. Charles elementary schools, a member of the Geneva Community hospital board, and a former director of the St. Charles chamber of commerce.

* * *

William T. Morgan, chief metallurgist, Taylor Instrument Cos., Rochester, N. Y., died recently. Mr. Morgan was born May 27, 1895, in Swansea, Wales, and attended the Swansea Technical college, Sheffield university, Sheffield, England. He served 5 years in the first World war, four of them on active service in France, Egypt and Palestine. After the war he became associated with R. D. Thomas & Co., steel and tinplate manufacturers in Swansea, later joining the department of scientific research of the British admiralty, where he spent 6 years. His first connection in the United States was with Babcock & Wilcox Co., Bayonne, N. J., and on Aug. 5, 1929, joined the Taylor Instrument Cos. where he assumed charge of the metallurgical laboratory and served as chief metallurgist since that time.

* * *

James M. Sampson, for the last 11 years engineer in charge of foundry processes and developments in General Electric's works laboratory at Schenectady, died Jan. 31 at Niagara Falls, N. Y. Mr. Sampson was born Jan. 18, 1878 at Niles Grove, Pa. He was graduated from the Carnegie Institute of Technology in 1908 with the degree of bachelor of science in metallurgical engineering. Before entering the employ of General Electric, Mr. Sampson had been foundry superintendent of the St. Louis Steel Co., metallurgical engineer in the U. S. bureau of mines, and for several years the foundry superintendent of the Watertown arsenal. He became connected with General Electric Co., Schenectady, in 1921 as superintendent of foundries, a position he held for 9 years. In 1930 he was transferred to the Schenectady works laboratory, where he was appointed engineer in charge of foundry processes and developments. His work has been of great benefit to General Electric, having improved the company's foundry processes and products. He was a member of the American Foundrymen's association.

* * *

Victor Stobie, prominent for many years in British metallurgical circles, died Dec. 31. A native of Birmingham, he was educated in the schools of that city and at St. Maur's school, Paris. He was a member of the Institute of British Foundrymen since 1912 and was president in 1932. During 1927 and 1928 he was president of the Newcastle branch of the association. After his return from Paris he studied electrical engineering at University college, Sheffield and then entered the metallurgical department of the same institution under the tutorship of professors Arnold and McWilliam. Later he established the Sheffield Annealing works. In 1912 he established an electric steel works on the Tyne at Dunston. Perhaps his most important contribution to the electric steel foundry industry was the invention in 1916 of the electrode and current economizer. He has been governor of the Surtes Memorial which holds examinations in foundry technique at Newcastle and Glasgow on alternate years and makes awards. He has presented papers on various technical subjects at meetings of the Iron and Steel Institute, the Institute of British Foundrymen and other societies and technical groups.

Foundry Activities

A NEW $1,500,000 foundry, equipped with the latest machinery for mass production of castings for naval vessels will be started soon at the New York Navy yard, Brooklyn, N. Y. It is understood that the new foundry will occupy 40,000 square feet of floor space on the site of the present foundry, which was built 75 years ago. The new plant will be built in sections, as only one part of the old building will be torn down at a time to make way for the new structure, thus avoiding interference with the present work at the yard. The foundry is one of 18 new building projects now under way, or about to be started at the yard at a cost of $14,500,000.

* * *

Western Alloyed Steel Casting Co. 2833 Grand avenue, Minneapolis, is building a plant addition.

* * *

W. Eckhardt, 4921 San Fernando road, Los Angeles, is building a foundry building 32 x 60 feet.

* * *

Canada Iron Foundries Ltd., St. Maurice street, Three Rivers, Que., is building a $25,000 plant addition.

* * *

Long Beach Iron Works, 2020 West Anaheim street, Long Beach, Calif., is building a shop addition 50 x 53 feet, to cost $5300.

* * *

American Stove Co., 825 Chouteau building, St. Louis, has let general contract for a building at 2001 South Kingshighway.

* * *

Builders Iron Foundry Inc., 9 Codding street, Providence, R. I., has built a 1-story addition 45 x 61 feet, at a cost of about $8000.

* * *

Ingersoll-Rand Co., Painted Post, N. Y., will build a plant addition 120 x 200 feet costing about $40,000. A. O. Carpenter is chief engineer.

* * *

Falk Corp., Milwaukee, has awarded the general contract for a two-story 38 x 125-foot addition to its plant.

* * *

Waukesha Foundry Co., Waukesha, Wis., is establishing a branch foundry at Watertown, Wis. to handle defense work.

* * *

Knapp Foundry Co., 1215 Sweitzer avenue, Akron, O., is erecting a warehouse building 52 x 66 feet at 90 Steiner avenue.

* * *

Gra-Iron Foundry Corp., 501 South Twelfth avenue, Marshalltown, Ia., manufacturer of gray iron castings, has completed a $9500, 50 x 90-foot addition to its foundry and is placing it in immediate operation.

* * *

Los Angeles Steel Casting Co., 2444 South Alameda street, Los Angeles, has built an addition to its plant 30 x 30 feet and to cost $2500.

* * *

Federated Metals division, American Smelting & Refining Co., has sold its controlling interest in Fisher Brass Inc., Marysville, O.

* * *

Accurate Foundry Co., 6401 Miller road, Detroit, recently has been organized to manufacture and sell nonferrous castings.

* * *

Cockshutt Plow Co. Ltd. Mohawk street, Brantford, Ont., has let general contract for an addition costing $15,000.

* * *

John Harsch Bronze & Foundry Co., 12502 Berea road, Cleveland, has made a further plant addition of about 6000 square feet costing $7500.

* * *

Permold Co., 6700 Grant avenue, Cleveland, is building a plant at Medina, O., for the production of sand and permanent mold castings of aluminum and magnesium alloys. The new unit will incorporate features which it is claimed not only will increase capacity and efficiency, but will make working conditions much more comfortable.

* * *

Atlantic Foundry Co., 182 Beaver avenue, Akron, O., will build an addition 40 x 80 feet, costing about $10,000, to increase manufacturing space.

* * *

American Brake Shoe & Foundry Co., 2001 Laurens street, Baltimore, is building a one-story foundry, 80 x 320 feet, to cost about $50,000.

* * *

Dominion Wheel & Foundries Ltd., 171 Eastern avenue, Toronto, Ont., is altering and making additions to its plant to cost $20,000.

* * *

Dominion Foundries & Steel Ltd., Depew street, Hamilton, Ont., is building an addition to its plant 120 x 150 feet to cost about $150,000.

* * *

High Duty Bronze & Aluminum Co., 514 Lloyd building, Seattle, has been organized by Harvey G. Schwarz to operate a brass and iron foundry.

* * *

McKinnon Industries Ltd., Ontario street, St. Catherines, Ont., is erecting a one-story building 260 x 460 feet, costing about $150,000 with equipment.

* * *

Square Deal Bronze Foundry Inc., 3237 Bellevue avenue, Detroit, has been organized by Steven J. Gergely, to manufacture bronze and brass castings.

* * *

Carondelet Foundry Co., St. Louis, is erecting a building to be used for storage, utilizing the space now taken by storage in the expansion of its manufacturing facilities.

* * *

Empire Ordnance Corp., care of Vulcan Iron Works, South Franklin and Horton streets, Wilkes-Barre, Pa., is altering and enlarging its foundry at an estimated cost of $40,000.

* * *

Industrial Castings Co., 8955 Thaddens avenue, Detroit, is erecting a concrete and steel addition to its plant which will provide 7000 square feet of floor space to house the office, pattern storage and cleaning room. The company has placed orders for $25,000 worth of new equipment. Although taxed to the limit

RAW MATERIAL PRICES
Feb. 18, 1941

Iron	
No. 2 foundry, Valley	$24.50
No. 2 Southern Birmingham	20.00
No. 2 foundry, Chicago	24.00
No. 2 foundry, Buffalo	24.00
Basic, Buffalo	23.00
Basic, Valley	24.50
Malleable, Chicago	24.00
Malleable, Buffalo	24.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$6.00 to $6.60
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	11.50
Scrap	
Heavy melting steel, Valley, No. 2	$20.00 to $20.50
Heavy melting steel, Pittsburgh, No. 2	19.50 to 20.00
Heavy melting steel, Chicago, Auto No. 2	16.00 to 16.50
Stove plate, Buffalo	16.50 to 17.00
Stove plate, Chicago	14.00 to 14.50
No. 1 cast, mchy., New York	18.50 to 19.00
No. 1 cast, mchy., Chicago	20.00 to 20.50
No. 1 cast, Pittsburgh	22.50 to 23.00
No. 1 cast, Eastern Pa.	24.00 to 24.50
No. 1 cast, Birmingham	18.00
Car wheels, iron, Pittsburgh	22.00 to 22.50
Car wheels, iron, Chicago	20.50 to 21.00
Railroad malleable, Chicago	23.50 to 24.00
Malleable, Buffalo	24.00 to 24.50
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	12.25
Straits tin	51.75
Aluminum, 99 per cent	17.00
Aluminum, No. 12 (Secondary, standard)	17.50
Lead, New York	5.65
Antimony, New York	14.00
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	7.25

of capacity, further increases in the volume of business are anticipated. Charles A. Brady is manager, and William L. Mayberry, foundry superintendent.

* * *

Forest City Foundry Co., 2500 West Twenty-fifth street, Cleveland, has built a storage building 44 x 75 feet, 2½ stories, which will release additional production space in the main plant.

* * *

Ferro-Machine & Foundry Co., 3155 East Sixty-sixth street, Cleveland, has built a 1-story shipping building 134 x 149 feet, costing about $20,000.

* * *

J. W. Cumming Mfg. Co. Ltd., New Glasgow, N. S., due to the expansion of its operations in the manufacture of steel and steel foundry products over the past several years, has changed its name to the Maritime Steel & Foundries Ltd.

* * *

United Engineering & Foundry Co., Vandergrift, Pa., has let general contract for a one-story plant addition and two 100 x 130-foot side additions. G. T. Ladd, First National Bank building, Pittsburgh, is president of the company.

* * *

Plant of the Geneva Foundry Corp., Geneva, N. Y., was entirely destroyed by fire Feb. 14, with a loss of $300,000, partly covered by insurance. W. J. Brennan was owner and general manager of the plant.

* * *

Enterprise Engine & Foundry Co., San Francisco, is building a machine shop on Eighteenth street, between Florida and Alabama streets, which will cover 19,500 square feet and triple the capacity of the company's present machine shop.

* * *

Neenah Brass Works Inc., Neenah, Wis. is building an additional 3500 square feet of production space. It will include additional floor space for the foundry, core room and cleaning and shipping rooms, and will be equipped with the latest type equipment and new melting furnaces.

* * *

Doehler Die Casting Co., New York, is building additions to its Pottstown, Pa., and Batavia, N. Y. plants to increase its facilities for the manufacture of die castings in zinc, aluminum, brass and magnesium alloys.

* * *

American Crucible Products Co., 1305 Oberlin avenue, Lorain, O., has asked war department for certificate to allow 5000-foot expansion for enlarged production of bronze alloy bearings. George L. Smith is secretary-treasurer.

* * *

Unitcast Corp., Toledo, O., has announced a large expansion program which includes addition of a number of new grinding, cleaning, and other machines as well as new core ovens. The company is working on subcontract defense orders for steel castings for tanks, airplane engines, motors, and other mechanical products. Robert Tillman is president.

* * *

Albany Castings Co., is the name of the new organization operating the plant of the formerly Albany Malleable Iron Co., Voorheesville, N. Y., idle for the past 3 years. Henry P. Blumenauer Sr. is president and principal owner, and T. Lavoie, superintendent. Both formerly were connected with the Arcade Malleable Iron Co., Worcester, Mass.

* * *

Index of foundry equipment orders for January, 1941, according to a recent report of the Foundry Equipment Manufacturers' association, Cleveland, was 285.3 as compared with 257.8 in December, 1940. Index of orders for new equipment was 301.8 and for repairs 235.8. The index of 100 represents the monthly average of reported sales to metalworking industries during 1937-38-39.

* * *

Light Metals Inc., Indianapolis, has been organized to manufacture magnesium alloy castings. A new building is being constructed and production is scheduled to start within 90 days. License for production has been obtained from Dow Chemical Co., Midland, Mich. Formation of the company was announced by Charles J. Gisler, president, C. & G. Foundry & Pattern Works, and Enterprise Iron & Fence Co.

Diamond Iron Works Inc., Minneapolis, manufacturer of machinery and gray iron castings, recently held its annual sales convention. Shown above, top row left to right are: R. C. Scott, J. M. Dennis, W. E. Wright, L. E. Cole, A. B. Hanse, F. B. Blancett, E. J. Towey, G. S. Gillespie. Bottom row: J. A. Nagle, C. T. Johnson, W. H. Riddell, H. S. Smith, E. F. Salomonsen, Fred Freeman

Birmingham Stages Lecture Course

The apprentice training course, sponsored by the Birmingham District Chapter of the A.F.A., is being well supported by the plants in the district. The first meeting held Jan. 10 at the Tutwiler hotel, Birmingham, was attended by 130 young men of the industry, and 62 members of the chapter, giving a total attendance of 162. The second meeting held Jan. 24 attracted an attendance of 225 and included many foundrymen from neighboring towns including Anniston, Tuscaloosa, Gasden and Holt.

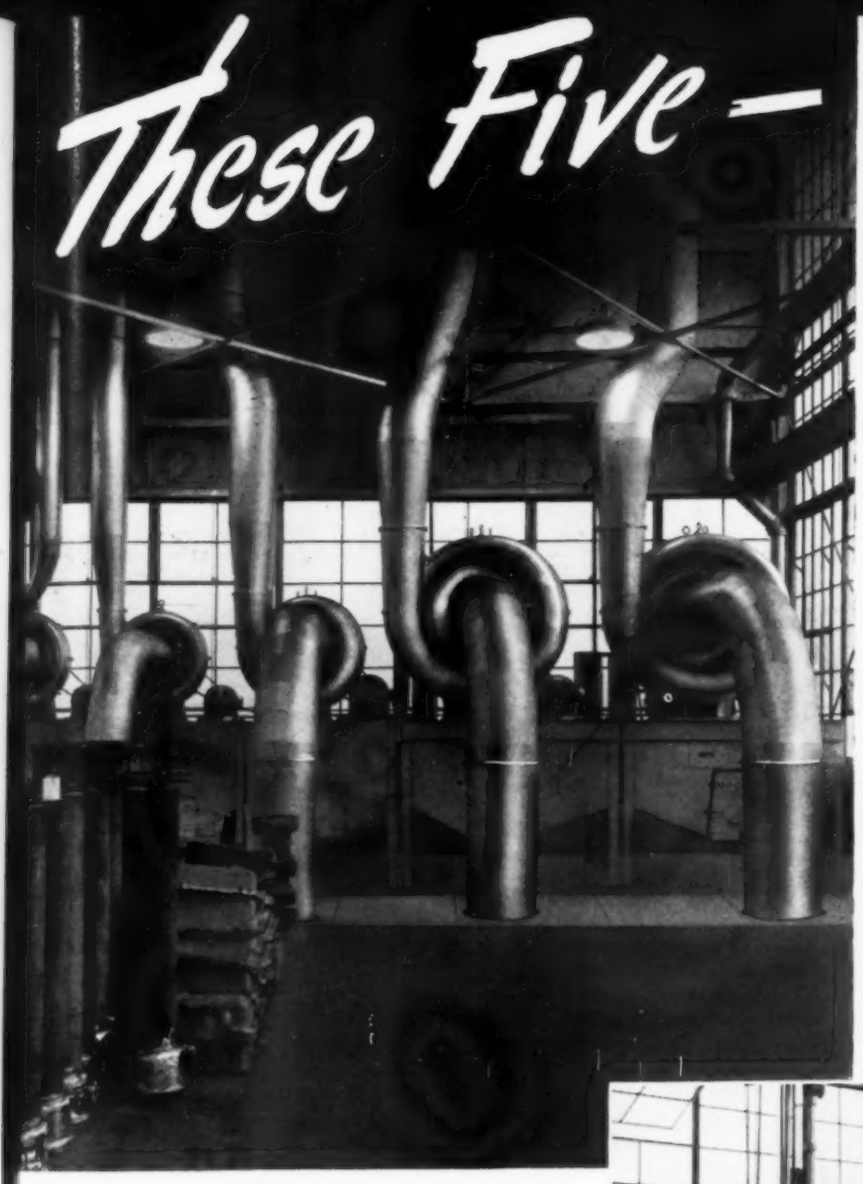
R. L. Ogden, chairman of the apprentice training committee, and also a director of the Birmingham chapter, presided at the first meeting, and outlined the complete training course. Carson Adams, Adams, Rowe & Norman presented the discussion of the evening on, "History of Molding from Ancient to Modern Times." The paper was prepared by Lester N. Shannon, president of the American Foundrymen's association, and vice president of the Stockham Pipe Fittings Co., Birmingham, who was unable to be present because of illness. The second meeting featured a talk on, "Modern Cupola Practice," by J. A. Bowers, American Cast Iron Pipe Co., Birmingham, and the third session was devoted to a paper entitled "Malleable Iron as Compared with Gray Cast Iron," by W. E. Jones, Stockham Pipe Fittings Co., Birmingham.

The training program includes a series of eight practical talks with explanatory devices, moving pictures, slides, etc., and trips to different furnaces, foundries, and other points of special interest to the young man in the industry. The first trip included a tour through one of the blast furnaces of the Birmingham district.

The committee of the Birmingham District chapter which has made arrangements for the meetings is as follows: R. L. Ogden, Stockham Pipe Fittings Co., chairman; Carson Adams, Adams, Rowe & Norman, Gordon Jones, U. S. Pipe & Foundry Co.; W. E. Curran, Republic Steel Corp., and J. A. Bowers, American Cast Iron Pipe Co.

These Five—

ROTO·CLONES
Collect Grinding Dust at Cincinnati-Bickford Tool Co.



The collection of fine floating dust from portable grinding in Cincinnati Bickford's enlarged finishing department is performed by 5 type D Roto-Clones. These units serve 10 stations comprising 4 floor grills, 4 rectangular tables, and 2 round tables. A total of 51,000 cubic feet of air per minute is exhausted which carries the generated dust downward from the grinding tools through grilled openings beneath the work.

Complete information on the application of the Roto-Clone to all types of industrial and foundry dust control is available without obligation. Write for Type D Roto-Clone Bulletin (covering dry dust collection) No. 272, and, (or) Type W Roto-Clone (wet collection) No. 274-A.

AMERICAN AIR FILTER CO., INC.
INCORPORATED
721 Central Ave., Louisville, Ky.

★ Upper view shows circular grilled table in use. Grinding dust is pulled through the grill and conveyed through ducts in a pipe trench to a Roto-Clone Precipitator.

★ Lower view in same room shows all three types of grinding stations served by the battery of 5 type D Roto-Clones.

ROTO·CLONE *DUST CONTROL SYSTEMS*

INCREASING SILICON WITH SILVERY IRON

(*Continued from page* 41)

pounds per square inch:

	Charge	Si	Mn
		Per Cent	
Silvery Pig	16	9.00	2.00
Returned Scrap	34	2.00	0.75
Steel	50	0.20	0.65

The intended casting analysis from this charge is 2.90 per cent carbon, 2.00 per cent silicon, 0.75 per cent manganese, 0.10 per cent sulphur, and 0.20 per cent phosphorus. The carbon content is maintained below 3.00 per cent by continuous tapping.

(2) For furnace castings requiring a fairly high carbon content, resistance to growth and good fluidity:

	Charge	Si	Mn
		Per Cent	
Silvery Pig	10	7.00	1.50
Pig Iron	15	2.00	1.50
Returned Scrap	25	2.30	0.75
Purchase Scrap	50	2.00	0.60

In this case the analysis of the casting is about 3.40 per cent carbon, 2.30 per cent silicon, 0.75 per cent manganese, 0.10 per cent sulphur and 0.20 per cent phosphorus.

(3) For castings requiring fair strength and machinability but which are extremely low in price:

	Charge	Si	Mn
		Per Cent	
Silvery Pig	3	7.00	1.25
Stove Plate Scrap	80	2.20	0.50
Steel	17	0.20	0.60

Castings from this mix analyze about 3.50 per cent carbon, 1.75 per cent silicon, 0.40 per cent manganese, 0.13 per cent sulphur, 0.46 per cent phosphorus. The strength of this iron is as high as 32,000 pounds per square inch.

Cupola charges for cupola malleable and for standard malleable iron made by the duplexing processes differ somewhat from those for gray iron in silicon and carbon contents. To keep the carbon low, the proportions of steel in mixes for malleable iron are somewhat greater than is customary for gray iron. The deficiency of silicon in the steel is made up by using silvery pig iron.

A typical charge used in producing cupola malleable is as follows:

	Charge	Si	Mn
		Per Cent	
Silvery Pig	8	8.00	1.50
Returned Scrap	40	1.00	0.40
Steel	52	0.20	0.60

Analysis of castings made from this mix is about 2.70 per cent carbon, 1.00 per cent silicon, 0.40 per cent manganese, 0.20 per cent phosphorus maximum, and 0.12 per cent sulphur maximum.

Duplex Malleable Iron

Several foundries producing standard malleable iron have turned to duplexing in seeking an answer to their need for quicker, cheaper, and more flexible melting. In most cases the charge is melted in the cupola and the iron is then heated to a higher temperature and adjusted in composition in either an air or electric furnace. Average charge for the cupola consists of returns, steel scrap, purchased cast scrap, and silvery pig iron. The following charge is typical:

	Charge	Si	Mn
		Per Cent	
Silvery Pig	12	10.00	2.00
Returns and Purchase Scrap	40	1.20	0.40
Steel	48	0.20	0.60

It is important that the analysis of the iron be controlled closely in the cupola as it is not practical to make extensive adjustments after the charge is melted. The finished malleable iron contains approximately 2.50 per cent carbon, 1.20 per cent silicon, 0.40 per cent manganese, 0.20 per cent phosphorus maximum, and 0.12 per cent sulphur maximum.

In the steel foundry silvery pig iron is used in the open hearth for hurrying the heat, controlling ferric oxides in the slag, blocking during the finishing period, and, in converter practice, as a source of silicon for the cupola mix. In open hearth melting practice the 15 per cent grade of silvery pig iron generally is used. It is added with the charge or to the bath of molten metal depending upon the results desired. The silvery pig helps to bring the heat up to temperature quicker and assists greatly in removing oxides from the bath. The 15 per cent grade reacts more thoroughly with the steel than do the lower silicon grades. It is heavier than the higher silicon alloys and therefore sinks more readily through the slag.

Cupola charges for supplying hot metal to the converter may contain substantial proportions of silvery pig iron, which supplies the silicon for the heat generating reaction in the converter. The following mix is producing an excellent grade of iron for converter practice:

	Charge	Si	Mn
		Per Cent	
Silvery Pig	16	11.50	2.00
Steel	84	0.30	0.60

Iron from this charge averages 3.00 per cent carbon, 1.90 per cent silicon, 0.60 per cent manganese, 0.10 per cent sulphur maximum, and 0.10 per cent phosphorus maximum.

A study was conducted under conditions normal for commercial foundry practice on two grades of silvery pig iron in cupola charges. The two types of silvery pig iron were of the 7 per cent and the 10 per cent silicon grades, having 7.35 per cent silicon and 10.50 per cent silicon respectively, and were used in charges producing iron having an approximate analysis of 3.30 per cent carbon, 2.00 per cent silicon, 0.65 per cent manganese, 0.09 per cent sulphur, and 0.30 per cent phosphorus. The cupola was lined to 54 inches and was equipped with a blast control. Metal charges were 2000 pounds and 250 pounds of coke was used between charges.

Runs were made on different days with part of the iron from each charge being poured into transverse test bars and into small laboratory test blocks for chemical analysis. The remaining iron was put into production in such miscellaneous castings as the foundry had scheduled for the day.

The first six charges of a test run were made up with 7 per cent silicon silvery pig iron and the next six charges were made up with 10 per cent silicon silvery pig iron as sources of part of the silicon.

Metal from the first, the middle, and the last of each charge was

(*Concluded on page* 112)

TABLE I

Chemical Analyses and Mechanical Properties of Casting

10 Per Cent of Charge as 7 Per Cent Si Silvery Pig Iron, 90 Per Cent Cast Scrap

Charge No.	T.C.	Si	Mn	S	P	Transverse* Strength lbs.	Deflection	Tensile Strength lbs./sq. in.	Brinell** Hardness	Metal Temp. at Spout °F.	Pouring Temp. °F.
1	3.38	1.72	0.64	0.080	0.257	....	....	....	...	2730	....
2	3.44	1.83	0.63	0.089	....	2565	0.344	33,900	190	2730	2550
3	3.50	1.95	0.62	0.092	....	2475	0.295	34,200	196	2720	2560
4	3.44	2.13	0.54	0.104	0.369	2350	0.323	29,700	186	2730	2530
5	3.47	2.21	0.54	0.113	....	2310	0.317	29,100	179	2730	2510
6	3.49	2.23	0.54	....	....	....	....	....	...	2740	....
Average	3.45	2.01	0.58	0.096	0.308	2425	0.319	31,725	188	....	....

NORTH AMERICAN
EQUIPMENT FOR
COMBUSTION

NORTH AMERICAN
MANUFACTURING CO., CLEVELAND, O.

(*Concluded from page* 110)
caught at the spout in small hand ladles and poured into consecutively numbered laboratory test blocks. These were sampled and analyzed in order that the change in composition within each charge as well as from charge to charge might be determined. One mold of four 1.2 inch transverse test bars was poured from the second, third, fourth, and fifth charges of each group of six charges. The first and last charges of each group were not used for transverse bars as it was thought these charges might be contaminated.

The cupola mixes used for the tests each day comprised the following:

First Six Charges	
Foundry Returns	900 pounds
Purchase Scrap	900 pounds
7% Si Silvery Pig	200 pounds

Second Six Charges	
Foundry Returns	925 pounds
Purchase Scrap	925 pounds
10% Si Silvery Pig	150 pounds

The analysis of the metallic raw materials used in computing the charges were as follows:

	Si	Mn	S	P
	Per Cent			
Cast Iron Scrap	1.60	0.66	0.080	0.28
7% Silvery Pig	7.35	1.29	0.034	0.128
10% Silvery Pig	10.50	2.25	0.028	0.054

An analysis was made of each test block and the transverse test bars were tested for transverse strength, tensile strength and brinell hardness. The condensed results of two typical runs are tabulated in Tables I and II. Some variation in silicon of the iron from the first two charges of the 7 per cent silicon silvery pig iron group is not hard to explain, since they preceded charges having only 1.40 per cent silicon and it may be that enough of this low silicon iron remained in the cupola hearth to contaminate the charges which followed. Other variations in analyses probably were due to the variety of scrap used. Temperature of the iron as it came from the spout was practically constant from day to day throughout the runs. The uniformity of temperature was due, no doubt, to the blast control equipment and the excellent cupola practice in the foundry.

In considering the results of these tests it should be emphasized that the iron produced was not intended to be a high test iron, but rather an exceptionally good, ordinary gray iron with above average physical properties, made from mixes containing 90 per cent scrap and no steel, and suitable for use in casting practically any type of medium-size, gray iron casting.

Adventures of Bill

(*Concluded from page* 62)
were, that was just too bad. These afflictions were particularly virulent in the winter season, and unfortunately the winter had such a distressing habit of lingering in this far northern country.

"The situation practically had reached the point where the irresistible force meets the immovable object. The party on the dock was tense and indignant. One party on the boat wished he never had yielded to a temptation which he now plainly realized was inspired by the Evil One. He might force himself to restore the dog, but he could not force himself to publicly admit his duplicity. Members of the crew with a financial interest in the outcome followed the proceedings closely. The drama collapsed when the dog came flying out of the galley with the duck in his mouth. He raced across the deck and made a flying leap from deck to dock. And that is the end of the story."

"What about the poem?"

"Oh, yes, the poem. Le's see. I have it here some place. Listen: Oh I am a hobo. Just a plain little hobo with no ambition for profit or gain. I hunt and I fish, and get drunk when I wish in my little camp way down in Maine. The high price of fuel does not worry me, for I know I never will freeze. With great piles of wood on the outside and the stove burning good on the inside, I can lie down behind or beside it like any gent taking his ease. When the old gang comes over, a little game of draw poker leaves some of the boys tearing their hair. We have whiskey so strong—Well, if you stay with it long, it will knock you right out of your chair. We have all the comforts of life in our camp and certain luxuries of which we dare not tell. We sit back or lie down with ease and we do as we please AND the whole outside world can go straight to ——!"

"Hold 'er," I said. "In fact I have listened too long. I think this—a—person was rude and impertinent."

"Oh, I don't know," said Bill. "He was healthy and happy. Not a care in the world. I thought of him again the other day when I saw the hobo picture. Success in this life takes two forms. One man burns himself out trying to acquire a little more material wealth. Another man has learned how to live happily on a minimum expenditure of time and energy. Example of the lad on the way to Maine, and the recent picture with the sharp caption make me wonder if I am so smart."

Gives Instructions

Air Reduction Co., New York, has prepared a series of books for instruction of students in oxyacetylene welding and cutting processes and in arc welding. Each subject is divided into two parts, namely lectures and exercises. Book of lectures on oxyacetylene welding contains 20 lectures, and sells for $1 while that on exercises contains 22 exercises and is priced at 50 cents. Book of lectures on arc welding contains 20 lectures and sells for $1, and that on exercises contains 30 exercises and sells for $1.

Increase Plant

Hammond Machinery Builders Inc., Kalamazoo, Mich., recently has built a new plant addition which doubles the manufacturing space, and includes a modern engineering office and demonstrating room, and a recreation room with showers, washfountains, lockers, etc.

Charles A. Hardy, Inc., and the Hardy Metallurgical Co. have moved to the Graybar Building, 420 Lexington avenue, New York.

TABLE II

Chemical Analyses and Mechanical Properties of Casting

7.5 Per Cent of Charge as 10 Per Cent Si Silvery Pig Iron, 92.5 Per Cent Cast Scrap

Charge No.	T.C.	Si	Mn	S	P	Transverse* Strength lbs.	Inches	Tensile Strength lbs./sq. in.	Brinell** Hardness	Metal Temp. at Spout °F.	Pouring Temp. °F.
7	3.50	2.11	0.53	0.117	0.385	....	....	.....	...	2750	....
8	3.44	2.07	0.53	0.132	....	2495	0.275	33,400	202	2740	2490
9	3.40	2.12	0.55	0.129	....	2250	0.239	34,250	207	2740	2520
10	3.32	2.03	0.53	0.129	0.398	2430	0.264	35,200	206	2750	2520
11	3.32	2.05	0.56	0.132	....	2510	0.279	35,250	203	2740	2500
12	3.34	2.14	0.61	....	....	....	....	.....	...	2740	....
Average	3.38	2.09	0.55	0.128	0.391	2421	0.264	34,525	204	....	....

*Tested on 18 inch centers.
**Measured at half radius position.

PROGRESS AIDS DEFENSE

(*Continued from page* 45)

scientific, metallurgical and economical basis.

Significance of this new scientific approach to the manufacture of gray iron is that new processed and alloy irons are available today on a dependable high-standard manufacturing basis that expands the availability of good materials for much defense equipment. These irons justly can be added to the list of strong ferrous metals and special purpose ferrous metals. For many parts where, in the past gray irons would be unsuited, today gray iron, made to control specifications, is a very satisfactory and often a superior material.

This all resolves itself in a possible enlarged service of gray iron foundries in national defense, both by directly supplying dependable castings of new possibilities and by releasing other manufacturing capacity for important uses that would otherwise be manufacturing the items now possible in the newer gray irons.

Modern gray iron is prepared.

Use Nondestructive Testing Methods Extensively

By CHARLES W. BRIGGS

Technical Adviser
Steel Founders' Society of America

ONE of the most interesting developments in the steel casting industry, particularly in the light of the country's rearmament program, is the extensive use of nondestructive testing methods. A large number of foundries are equipped to carry on nondestructive inspection, and many foundries doing government work have made nondestructive testing a part of their daily routine. A considerable number of steel foundries are using gamma ray radiography at the present time for inspection and for studies of casting technique. Radium is more popular than x-ray as an energy source.

The navy recently has advised that radiographic examination was being extended to all steel castings for main propulsion turbine castings, main steam chests, main steam line fittings and main steam valves. Also, radiographic examination is being given to principal ship castings such as stems, stern posts, struts, rudder castings, stern tubes, turret roller path castings and other castings subjected to severe shock.

A number of steel foundries have qualified or are qualifying under the ballistic test requirements of both the navy and the army for armor plate castings. Some armor plate castings orders are being filled. Experimental orders on the casting of shells are also being undertaken.

Much thought, study and experimentation is being given to applying alloyed cast steels in the quenched and tempered condition for use in high strength structures which require considerable toughness. Also, the use of the centrifugal process for steel castings has progressed as far as the number of foundries equipped to handle this type of work is concerned. A greater number of pattern designs are being adapted for production by this process.

Cast-weld construction and composite construction seem to be retaining their popularity and these forms of construction will undoubtedly be further developed under the rearmament program.

Much consideration has been given to steel castings design during the year, and fundamental rules are being placed before the design-

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ing engineer for his use. Steel Founders' Society of America is very active in this regard, having just completed a sound slide film on "The Designing of Steel Castings," and a *Steel Castings Handbook*. Film illustrates many ordinary and special design problems, while the handbook presents considerable information on the mechanical and physical properties, the manufacture, heat treatment, design and uses of carbon and alloy cast steels.

Studies on sand as effected by higher temperatures are going forward under the direction of the American Foundrymen's association. Preliminary reports show interesting results.

More consideration is being given the preparation of patterns and castings for controlled directional solidification and important studies on chills and welding of steel castings has been presented.

Malleable Foundry Industry Has Improved Steadily

By F. O. PARKER

Sales Manager
Acme Steel & Malleable Iron Works, Buffalo, N. Y.

IN THE writer's opinion the malleable industry during 1940 showed some 25 per cent increase over 1939 as far as shipments are concerned. The industry has improved steadily during the past few years in regard to foundry technique, soundness of castings, and improved methods of inspection. The entire industry realizes the importance of maintaining these improvements with the influx of business which is being experienced at this time. Improved annealing ovens and mechanical equipment have enabled the malleable foundries to look after the increased business, and give better deliveries than was possible some years ago.

Improve Practice Technique in Malleable Work

By ENRIQUE TOUCEDA

Consulting Engineer
Malleable Founders' Society, Cleveland

THERE have been no noteworthy developments in the manufacture of malleable iron castings either in metallurgical, molding or cleaning apparatus during the past year. Omitting details regarding the quick anneal which now is an old story, it can be stated that there has been a constant improvement in works' practice technique, particularly in heat treating operations, where special annealing cycles have been developed that have operated to substantially increase the toughness of the products without any sacrifice of ductility.

In connection with the business end of the industry, as has obtained in the case of the various products with which it is in competition, conditions were more or less deplorable until the start of the pick-up several months ago. At the present time, however, most of the plants are busy and in a few instances have more work than they can handle without further plant expansion, a situation that, due to the defense program, appears likely to continue for an unpredictable length of time.

With the increase in cost of raw materials, the price asked for the castings necessarily must be raised. In regard to the status of malleable iron used in the rearmament program, possibly a larger tonnage will be employed for parts for trucks, scout cars and ambulances that will be used in larger number by the United States and British armies, particularly as all of the wheels, except possibly those of the ambulances, will be drive wheels. One of the automobile companies already has begun production on an order for the army for 21,500 streamlined trucks equipped with built-in brush guards and blackout lighting at a production of 200 daily.

Among the malleable parts to be

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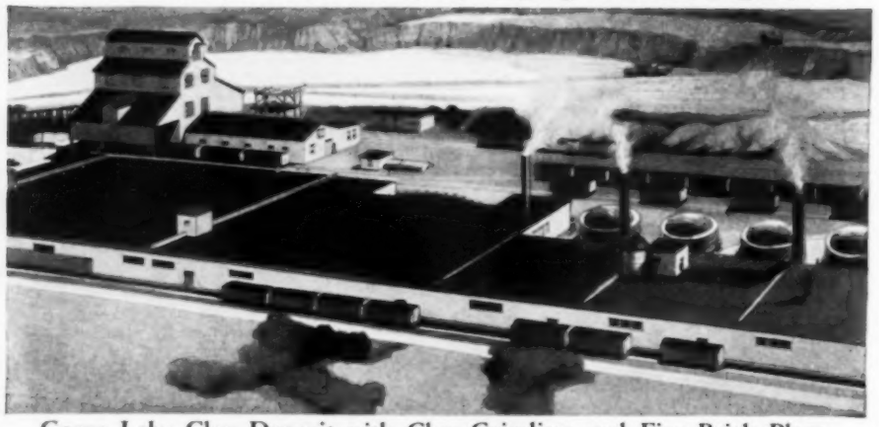

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used in truck and automobile construction are differential carriers, cases, bearing caps, steering gear housings, spring hangers, spring seats and shackles, etc. The gear cases will be ordered in quantities of 2000 and weigh approximately 2 pounds each. The hoops in quantities of 500, weighing 100 pounds each.

Samples of 75 millimeter mortar shells are to be submitted to the Ordnance department in order that at the Pickatinny Arsenal they may test out their suitability for the use intended. Castings also will be required for gun cradles and mortar mounts.

Improvements and innovations in work's practice details as they are developed easily are passed to the executives of the society at their monthly meetings and subsequently to their key-men at shop-practice committee meetings which are quite regularly held at cities most conveniently located to suit the convenience of the member plants of the Western, Central, and Eastern sections. Some weeks prior to these meetings the section members are furnished with a bulletin covering the major topic to be taken up for discussion, technical details regarding which are entered into and clarified if essential, all of which it has been found has proven highly beneficial to the member plants not only from a metallurgical and plant-practice point of view, but in many instances production costs have been cut with safety. In addition to the foregoing set-up there is a technical council, the members of which hold a meeting from time to time. Their duties are to personally undertake and carry through co-operative research projects.

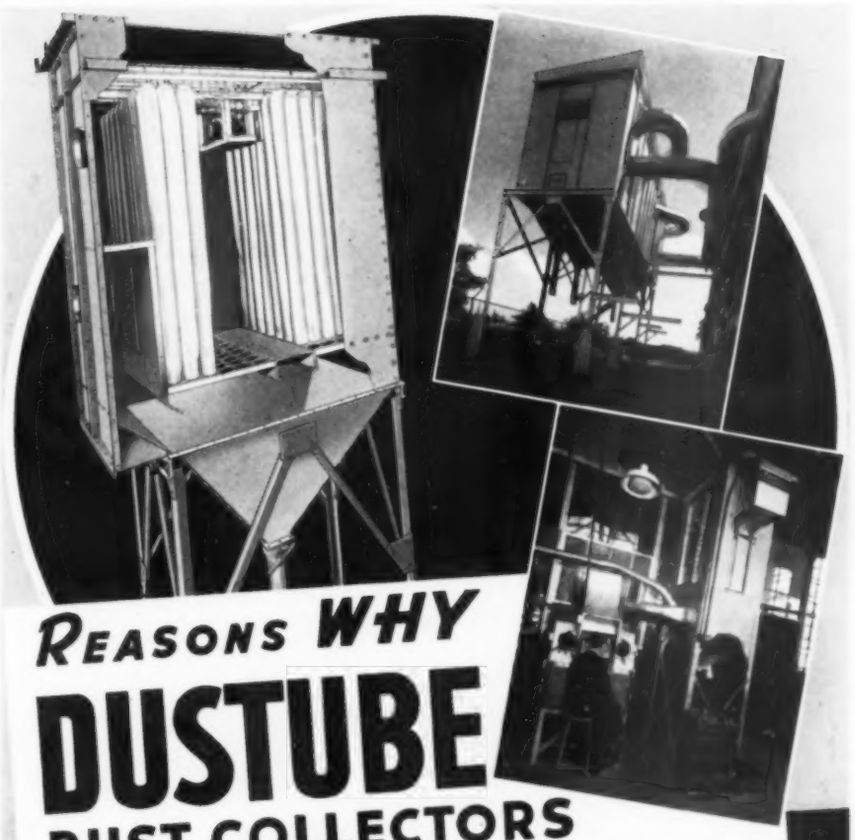
Frequent plant visitations are made by the society's shop practice engineer for the purpose of investigating the plant practice of the individual plants on the one hand, and on the other, to furnish them with technical advice should this be needed.

As has been the practice for many years past, tensile test bars are sent by the various plants to the consulting engineer's office in order that through his reports on the results the executives of the society may keep posted as to the quality of product turned out by the different plants.

In the following table are figures showing the average tensile test bar results for the past year, which average includes not only those plants that run on the higher A.S.T.M. specification but those which run on the lower, that is, no selections have been made.

Average ultimate strength, 54,500 pounds per square inch.

Average yield point, 35,300 pounds per square inch.



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Only one man is needed to install the tubes in a "Dustube" Dust Collector, and he works on the clean air side. Each tube is an independent cell which can be replaced in a few minutes. It is not necessary to remove any bolts, screens or frames to determine the condition of the tubes.

Corrosion and cloth wear are eliminated because there are no metal screens or frames to contact the tubes. The possibility of clogged areas is also eliminated, because the bag is deflated when shaken—it is never under tension.

An improved shaking device insures lower back-pressure range, longer cloth life, and less power consumption. Then, too, when the tubes are shaken, the precipitated dust falls immediately into a storage hopper—it never descends upon other dust cells.

"Dustube" tubes are compact, light, easy to store, economical to ship, and materially decrease the weight of the collector.

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Elongation, 18.00 per cent in 2 inches.

As a matter of interest, and as an example, the average tensile properties of seven of the plants running on the A.S.T.M. specification No. 35018 are recorded below:

Average ultimate strength, 56,480 pounds per square inch.
Average yield point, 37,340 pounds per square inch.
Average elongation, 23.00 per cent in 2 inches.

The engineer-designer bases his design figures on yield point and elongation. The production engineer on the ease and rapidity with which the metal can be machined. In view, therefore, of the high tensile properties of the product, coupled with the fact that it can be machined with greater speed and ease than is possible in the case of any other ferrous product, both parties should be satisfied that there is available a product not only the equal of steel in respect to spread of elastic range, but also three malleable iron castings can be machined in about the time it takes to machine two of the others.

Several plants are making an alloy malleable iron product, the average tensile properties of which exceed by considerable those of the product made in accordance with the higher specification.

In regard to pearlitic malleable iron, the tonnage of which to date has not been large, it is possible that in the near future there may be a substantial demand by the ordnance department for this type of casting for shells of certain size and while tests are now being made, nothing definite will be known regarding the results for some time to come.

The tensile strength of pearlitic malleable varies from 65,000 to 85,000 pounds per square inch. The elongation will average around 12 to 15 per cent for the lower strengths and from 5 to 7 per cent for the higher, while the yield point will vary upwards quite consistently with increase in tensile strength.

There is no standard method for the manufacture of the product. In some cases the pearlitic matrix formed is produced through the addition to the ladle or furnace of a certain amount of carbide stabilizer and in other cases through means of heat treatment. In the latter cases it is the annealed normal malleable cast iron product that is subjected to heat treatment.

Book Review

Modern Foremanship and Supervision Under New Deal Legislation, by Harvey B. Rector and W. A. Rinckhoff; cloth, 156 pages 4½ x 7 inches; published by Law Research Service, Cincinnati, for $4.50.

This book is not intended to train men completely for supervisory positions. It embodies an advance course for the specific purpose of training foremen and supervisors to perform their duties in compliance with New Deal legislation. In addition to a presentation of the essentials of good foremanship and supervision under the new laws, the book is a medium through which the duties can be performed and at the same time protect the constitutional rights of employers.

The book is the result of four years' research and suggestions contributed by many of the nation's leading manufacturers and corporation attorneys. Scope of the work may be inferred from the introduction and headings: Unfair labor practices under the national labor relations law; unfair labor practices under the fair labor standards act; unfair labor practices under the Walsh-Healey act.

Total production of malleable iron castings in 1940 was 565,923 short tons, according to the department of commerce, bureau of census, Washington. This compares with 480,578 tons in 1939, and 289,914 tons in 1938.

SAY, GERTIE, WHO WAS THAT FOUNDRYMAN I SEEN YOU WITH LAST NIGHT?

THAT WAS NO FOUNDRYMAN, MABEL . . .
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PITTSBURGH, PA.

GATING IS IMPORTANT

(*Continued from page* 39)

to this practice that need not be discussed here but they are the reasons so many foundrymen today are making their castings from gates that lead the metal quietly into the bottom of the mold and then provide the necessary feeders at the top of the mold in the form of risers.

It should be emphasized, that the choice between two different gates for a given casting should be influenced materially by the position the mold will be in during the pouring process and the consequent effect upon the flow of metal into the mold. Obviously some types of gates hardly would be worthy of consideration were it not for the fact that the mold is in an inclined position thus permitting the metal to flow by gravity through the runner into one part of the mold and later to flow into the remainder of the mold as the low end becomes full. This necessarily forces a definite procedure in filling the mold and produces directional cooling of the molten metal. This results in a definite condition which must be taken care of by necessary feeders in the form of risers.

Promote Progressive Cooling

Where the mold is such that it is not desirable to cast it in a sloping position, the cooling of the metal therein should be studied so that the gating provided will insure progressive cooling from one point to that where the riser will feed very definitely the last part of the mold to cool.

Use of multiple gates versus a single gate is a subject debated by many foundrymen in the case of small castings. Of course, in the case of large castings requiring large masses of metal adequate entrances of metal must be provided to insure filling the mold with a minimum of trouble, including delay, abrasion on the mold cavity and other conditions that must be taken into account when considering the proper flow of the metal into the mold cavity. Gates must be sufficiently small to freeze properly once the pouring has ceased.

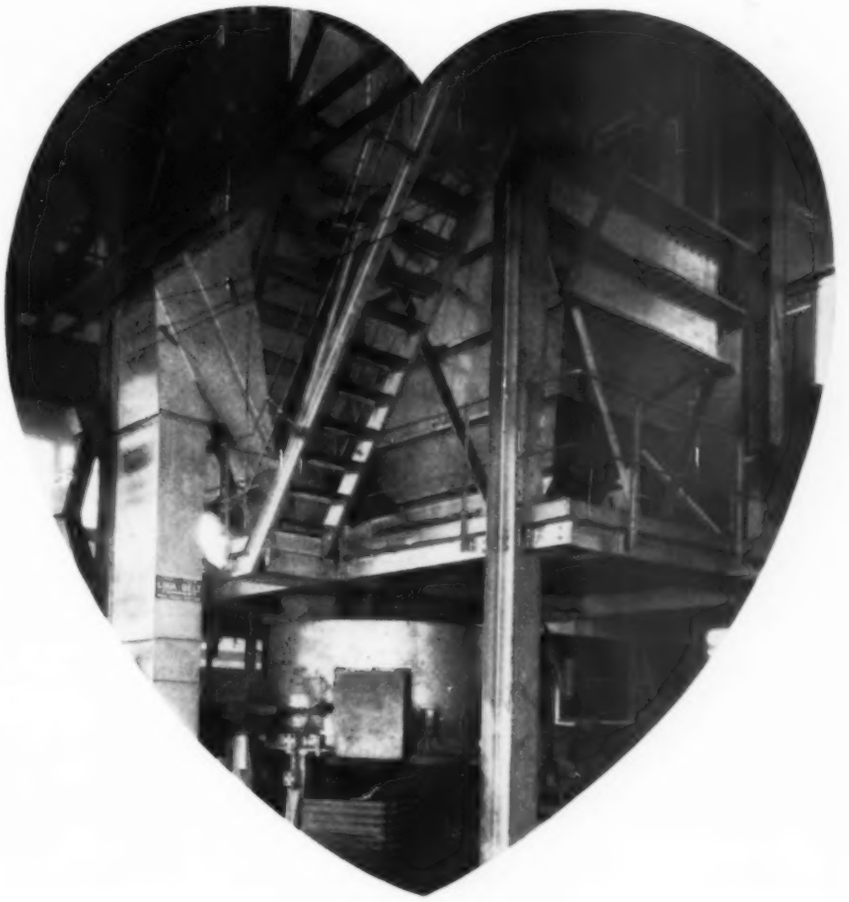
That is made necessary by the fact that a gate which freezes after the casting has set demands feeding from the casting and consequently develops an unsound section which might cause ultimate rejection of the casting. Restriction of the gates to a point where they produce a squirting or nozzle effect has been proved objectionable in the case of almost all of the alloys cast in the nonferrous foundry.

Such effect is particularly true of the high shrinkage alloys containing aluminum or silicon which can form suds or dross when agitated in the presence of air.

After all of the considerations enumerated in this series of articles on gating have been considered carefully and the necessary allowance made for the type of material that is to be cast, the question of using a single gate or a number of gates then must be decided. Following that decision the size of gates, their connection with the casting, and the location of the proper restrictions must be determined so that the flow of metal is controlled without producing a squirting effect into the mold cavity. After all of these things have been determined then we should have arrived at a plan that will yield satisfactory castings with a minimum amount of labor and trouble in removing of the gates after the castings have been made.

It is hoped that the material offered on the subject of gating nonferrous castings will create discussion and the author will appreciate any comment which will sug-

IF YOUR SAND MUST BE RIGHT



PUT A CLEARFIELD MIXER IN THE HEART OF THE SYSTEM

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gest points overlooked in the articles to date so that future offerings may cover those of interest.

This is the fifth of a series of articles on gating nonferrous castings. The first four articles appeared in November and December, 1940, and January and February, 1941. The sixth will be presented in an early issue.

THE EDITORS.

Pollard Oil Products Co., Milwaukee, has been appointed distributor in the Milwaukee district and outlying territory for the line of core oils made by the Velsicol Corp., 3542 North Kimball avenue, Chicago.

A.S.T.M. To Meet In Washington

Annual Spring meeting and committee week of the American Society for Testing Materials will be held on March 3 to 7 at the Mayflower hotel, Washington. The meeting will consist of two symposiums on "Color — Its Specification and Use in Evaluating the Appearance of Materials" and "New Methods for Particle Size Determinations in the Subsieve Range." Committee week will comprise over 200 meetings of various standing committees of the society and their subgroups.

The forty-fourth annual meeting and exhibit of testing apparatus and related equipment of the American Society for Testing Materials will be held during June 23 to 27 at the Palmer House, Chicago.

Plan West Michigan A.F.A. Chapter

Second meeting of members of the American Foundrymen's association in Western Michigan was held at the Occidental hotel, Muskegon, on Monday, Feb. 3. Over 95 were present from various cities, including Muskegon, Grand Haven, Grand Rapids, South Haven, Battle Creek and Cadillac. Don Seyferth, works manager, Michigan Steel Foundry Co., Muskegon, presided. L. P. Robinson, Werner G. Smith Co., Cleveland, and a director of the A. F. A., presented the discussion of the evening on problems relating to core room practice in the foundry.

The chairman introduced A. W. Gregg, Whiting Corp., Harvey, Ill., and John Abbott, Hickman, Williams & Co., of the Chicago chapter, who discussed various phases of chapter activities. V. C. Bruce, Buckeye Products Co., was introduced as representing the Central Indiana chapter.

Following the technical features, those present discussed the formation of a chapter, and a petition was signed for presentation to the board of directors of the American Foundrymen's association, requesting authorization for a chapter. It was announced that the organization meeting will be held on March 3, and that A. W. Gregg, Whiting Corp., Harvey, Ill., will talk on "Cupola Practice."

Heat Treatment

An effective method of heat treating magnesium-aluminum alloys, exceedingly useful when carrying out development work or producing a small batch of casting when extreme urgency of delivery is required, can be effected in a normal type of muffle such as encountered in the laboratory or in a tool-hardening shop. The castings are sandblasted and dipped for a few seconds in a 10 per cent solution of hydrofluoric acid which produces a perfect sealing coat of magnesium fluoride which, although of little depth, is exceedingly dense and absolutely impervious to reaction in the normal muffle atmosphere. Heat treatment is similar to that carried out in an inert-atmosphere furnace, and duration of the treatment is the same.

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REDUCING AMOUNT OF CORE GAS

(*Concluded from page* 43)

be considered in connection with the fineness of the sand. As the core sand becomes coarser, the permeability of the core increases. This causes the heat to travel faster through the core. This in turn causes the core to burn faster and create a fast rate of generation for the gas contained in the core. This factor often limits the coarseness of a sand to a conservative fineness to avoid a too rapid gas generation or core collapse.

It readily is apparent that the quantity of binder added to a core mixture will influence the total quantity of gas contained in a core. This point is illustrated in Fig. 2. The gas content of a core made with sand 98 per cent, oil 1.00 per cent, is 6.9 cubic centimeters per gram of core and 17 cubic centimeters when the sand to oil ratio is 40 to 1. The greater the quantity of binder used in the core mixture, the greater the volume of gas generated by the core when raised to a high temperature by the molten metal. Thus through the use of a minimum quantity of strong core binder the volume of core gas may be kept to a minimum amount.

Bake at High Temperature

Gas content of a core may be reduced by baking the core at a high temperature with some sacrifice in the baked strength of the core. A study of curves in Fig. 3 shows how the gas content is reduced quickly by baking the core at higher temperatures. Table I shows the gas content and tensile strength for cores baked at 350, 400, and 450 degrees Fahr. Where a core is baked at a temperature to confer maximum strength, little reduction in gas would be obtained by selecting a high baking temperature. By selecting a high temperature and slightly over baking the core, a substantial reduction in the volume of gas may be had. For example a core baked at 450 degrees Fahr. will show a gas content of 12.8 cubic centimeters as compared with 17.0 cubic centimeters when baked at 350 degrees Fahr. The sacrifice in tensile strength is from 237 pounds at 350 degrees to 177 pounds at 450 degrees Fahr. Where the design of the casting limits proper venting of the core it may be expedient to bake the core at a higher temperature and over a sufficient length of time to slightly over bake the core.

Rate at which the gas in a core is liberated may be as important as the total volume of gas. One core with 7.0 cubic centimeters of gas per gram of core may liberate the gas rapidly. A second core with 10 cubic centimeters of gas per gram of sand may liberate the gas at only half the speed of the first.

The gas rate curve in Fig. 4 illustrates the rate at which gas generation is affected by two different core mixtures. The rate is identical for the first minute when the core is subjected to a temperature of 1800 degrees Fahr. The rate varies greatly as the immersion time increases. Total volume of core gas for the two cores differs to a marked extent.

Carborundum Co., Niagara Falls, N. Y., recently has published a booklet commemorating the fiftieth anniversary of the creation of silicon carbide by Edward Goodrich Acheson. Dr. Acheson produced the first crystals of the hard, sharp, diamond-like substance in a tiny electric furnace at Monongahela City, Pa., in March, 1891. The Carborundum Co. was formed in September of that year.

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Dust Collectors

CONVENTION PROGRAM ARRANGED

(*Continued from page 42*)

foundry industry.

A partial list of tentative papers, with their authors, for the many technical and research sessions follows:

"Observations on Malleable Furnace Refractories," by J. A. Kayser, Laclede-Christy Clay Products Co., St. Louis.

"Natural Stone as a Cupola Refractory," by F. J. Wurscher, Acme Steel & Malleable Works, Buffalo.

"Graphitization of Cementite in Cupola White Iron," by N. A. Ziegler, Crane Co., Chicago.

"Velocity of Conversion of Austenite, Ferrite and Cementite," by Harry A. Schwartz, National Malleable and Steel Castings Co., Cleveland.

"Malleable Iron for the Defense Program," by J. H. Lansing, Malleable Founders' society, Cleveland.

"Flame Hardening of Malleable Iron," by Stephen Smith, Air Reduction Sales Co., New York.

"Observation on the Duplexing of Malleable Iron," by G. A. Schumacher, Albion Malleable Iron Co., Albion, Mich.

"Gating and Risering for High Pressure Iron Castings," by H. H. Judson, Goulds Pumps, Inc., Seneca Falls, N. Y.

"Effects of Moisture and Preheating on Cupola Blast," by J. T. Eash and R. E. Smith, International Nickel Co., Bayonne, N. J.

"Certain Aspects of Hydrogen in Cast Iron," by C. A. Zapffe, Battelle Memorial institute, Columbus, O.

"Effects of Pouring Temperatures on Mechanical Properties of Cast Iron," by V. A. Crosby, Climax Molybdenum Co., Detroit.

"Factors Influencing Graphitizing Behavior of Cast Iron," by S. C. Massari, Association of Manufac-

Tentative Program

Monday, May 12

9:00 a.m.	Registration
10:00 a.m.	Sand Shop Course, Nonferrous
10:30 a.m.	Refractories
11:30 a.m.	Gray Iron Shop Course
2:00 p.m.	Malleable
2:00 p.m.	Nonferrous
2:00 p.m.	Safety and Hygiene
3:00 p.m.	Chapter Delegate Meeting
4:00 p.m.	Foundry Costs
4:30 p.m.	Lecture Course, Session
7:00 p.m.	Chapter Officers' Dinner
7:00 p.m.	Engineering Instructors' Dinner

Tuesday, May 13

9:30 a.m.	Sand Shop Course, Malleable
10:30 a.m.	Malleable
10:30 a.m.	Nonferrous
10:30 a.m.	Gray Iron
10:30 a.m.	Job Evaluation and Time Study
12:30 p.m.	Malleable Round Table Luncheon
12:30 p.m.	Nonferrous Round Table Luncheon
2:00 p.m.	Sand Research
2:00 p.m.	Apprentice Training
3:30 p.m.	Gray Iron Shop Course
4:30 p.m.	Lecture Course, Session
7:00 p.m.	Apprentice Supervisors' Dinner

Wednesday, May 14

9:20 a.m.	Sand Shop Course, Gray Iron
10:30 a.m.	Business and Awards Meeting
1:00 p.m.	Steel Division Round Table Luncheon
2:00 p.m.	Sand Research
2:00 p.m.	Patternmaking
2:00 p.m.	Foreman Training
3:30 p.m.	Gray Iron Shop Course
4:30 p.m.	Lecture Course, Session
7:30 p.m.	Annual Dinner

Thursday, May 15

9:30 a.m.	Sand Shop Course, Steel
9:30 a.m.	Gray Iron Shop Course
10:30 a.m.	Gray Iron
10:30 a.m.	Steel
10:30 a.m.	Plant and Plant Equipment
2:00 p.m.	Gray Iron
2:00 p.m.	Steel
4:00 p.m.	Lecture Course, Session

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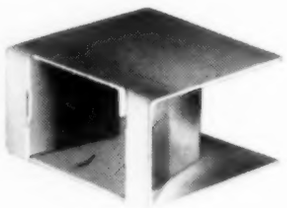

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turers of Chilled Car Wheels, Chicago.

"Undercooling of Gray Cast Iron," by Alfred Boyles, Battelle Memorial institute, Columbus, O.

"Nickel-Molybdenum Cast Irons," by R. A. Flinn, American Brake Shoe & Foundry Co., Mahwah, N. J., and Donald J. Reese, International Nickel Co., New York.

"Heat Treatment of Cast Iron," by C. A. Nagler and R. L. Dowdell, University of Minnesota, Minneapolis.

"Fluidity of Cast Steels," by H. F. Taylor, Naval Research laboratory, Anacostia, D. C.

"Mechanism of Pin-Hole Formation in Cast Steel," by C. E. Sims and C. A. Zapffe, Battelle Memorial institute, Columbus, O.

"Recent Developments in Producing Converter Cast Steel," by A. H. Jameson, Malleable Iron Fittings Co., Branford, Conn., and A. W. Gregg, Whiting Corp., Harvey, Ill.

"Foundry Budgeting," by E. C. Bumke, Oliver Farm Equipment Co., South Bend, Ind.

"Welding Aluminum Castings," by F. T. McGuire, Notre Dame university, Notre Dame, Ind.

"Effects of Furnace Atmospheres in Nonferrous Melting," by J. M. Kelly, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Magnesium Alloy Foundry Practice," by M. E. Brooks and A. W. Winston, Dow Chemical Co., Midland, Mich.

"Aluminum - Copper - Magnesium - Zinc Castings," by L. W. Eastwood and L. W. Kempf, Aluminum Co. of America, Cleveland.

"Some Properties of Foundry Sands at High Temperatures," by G. W. Eberhardt, Cornell university, Ithaca, N. Y.

"Progress Report on Investigation of High Temperature Effects on Steel Sands," by J. R. Young, Cornell university, Ithaca, N. Y.

"Dry Sand Molding Procedure for Heavy Castings," by W. A. Hambley, Allis-Chalmers Mfg. Co., Milwaukee.

"Testing of Foundry Sands and Its Co-ordination with Molding Procedure," by J. J. Boland, Griffin Wheel Co., Chicago.

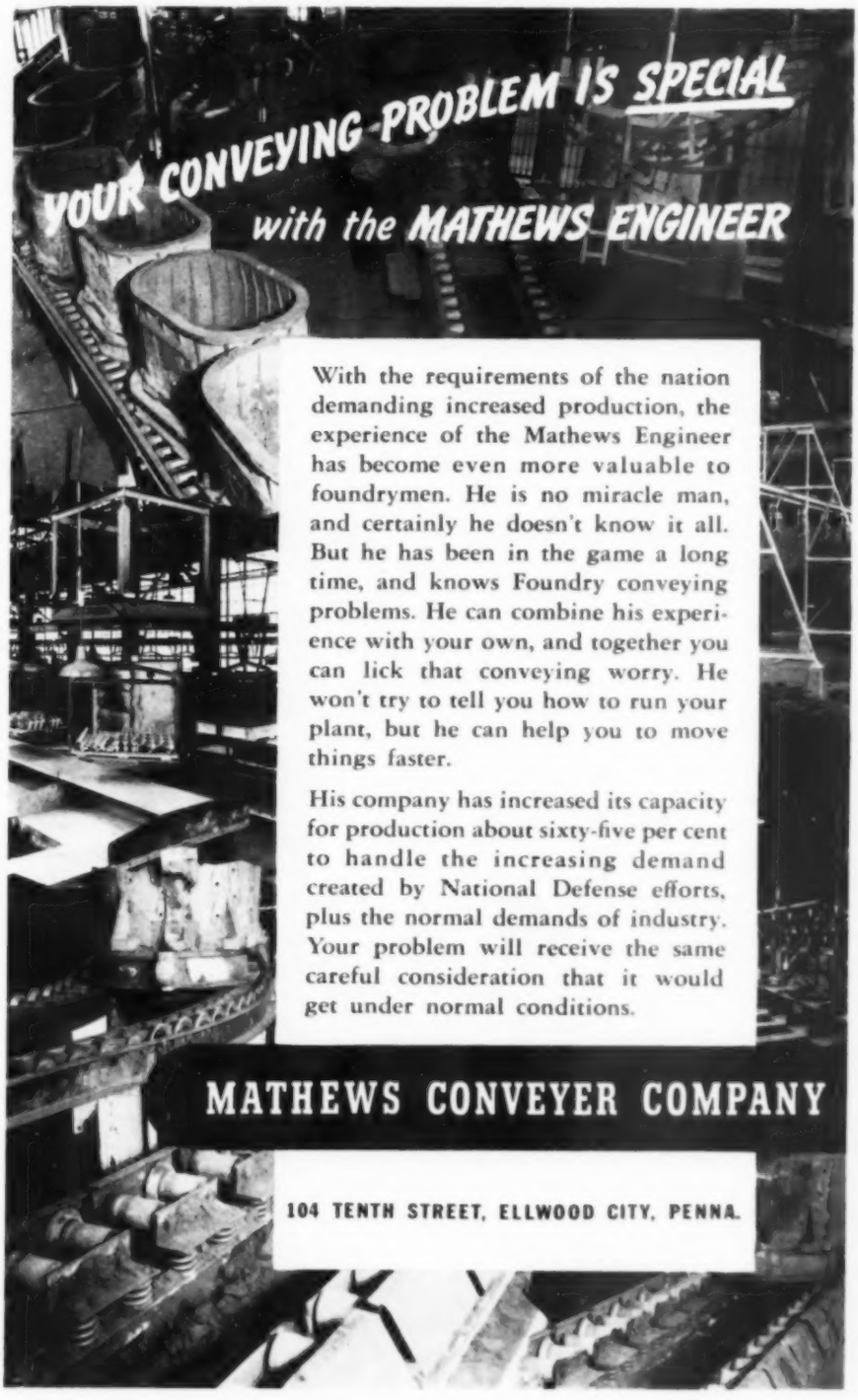
"Results of Investigation of Checks Between Laboratories of Sand Fineness," by Stanton Walker, National Industrial Sand association, Washington.

Preconvention Trip To Virginia

TAKING advantage of the fact that this will be the first A.F.A. convention in the east for many years, preconvention trips are being arranged to Washington and the historic Williamsburg section of Virginia. It is planned to provide for the west and midwest members to meet in Washington on Saturday, May 10 for a sightseeing trip, later taking one of the steamers of the Norfolk & Washington Steamship Co. for a cruise down the Potomac, reaching Norfolk Sunday morning.

After a tour of Norfolk and Newport News, the party will be taken to Williamsburg for lunch, there viewing the famous buildings which have recently been restored to their Revolutionary period form. In the late afternoon the party will proceed to Jamestown and Yorktown, stopping at Old Point Comfort, returning to Washington by boat in time to leave Washington the next morning for New York.

This trip is proposed as it is realized that many members in the west and midwest would like to combine a sightseeing opportunity with a trip to the convention, taking advantage of the fact that the railroads can provide return trip fares to New York by way of Washington, returning home from New York by any direct route that may be preferred.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PRODUCING MAGNESIUM CASTINGS

(*Continued from page* 37)

ure to provide ventilation of the gas which is formed.

Generally, any good quality core oil is suitable for use, but preference should be given to those forming a minimum of gas. Cereal binders find a limited application. As they tend to absorb moisture, especial care is necessary to keep cereal-bonded cores warm and dry before use. In choosing a core binder, consideration must be given also to the ease with which the cores can be removed from the casting as determined by trial. Ordinary ratings of this characteristic may not apply in casting magnesium alloys, as the temperature and heat capacity of the light metal surrounding the core is low and the core bond will not be burned out as in the casting of heavier metals.

It is necessary that the core sand be treated with an inhibitor to prevent burning of heavy metal sections. Two types of practice have been developed for obtaining this protection as follows: In one case, low percentages of sulphur and boric acid are mixed with the core sand, while in the other type the baked cores are sprayed with an aqueous solution of a fluoride. In the latter case it is necessary to return the sprayed cores to the oven for a short drying period (30-60 minutes) after the spraying operation. The fluoride spray is used also on the cores containing sulphur and boric acid where very heavy metal sections contact the core. Additional protection sometimes is obtained by painting parts of cores with a suspension of sulphur in alcohol. This is used to a limited extent due to the danger of too heavy a coating of sulphur remaining on the core and causing trouble by bubbles of gas passing through the metal if proper venting of the core is not attained.

A typical core sand mixture for general use is as follows:

	Parts by Volume
Sand*	1000
Oil	12
Dextrine	8
Sulphur	13
Boric Acid	13

*The sand is a mixture of 40 per cent with 100 average grain fineness and 60 per cent with 65 average grain fineness. Moisture content is 6.5 per cent by weight.

Standard A.F.A. specimens before and after baking two hours at 420 degrees Fahr. will have approximately the following properties:

Green-Compressive Strength	0.3	lb./sq. in.
Baked-Tensile Strength	120	lb./sq. in.
Hardness	85	
Permeability	85	

By the addition of more oil the strength can be raised as desired but care should be taken to avoid excessively strong internal cores as they may cause casting cracks. Softer cores may be made by reducing the amount of oil, with, of course, increased fragility and difficulty in handling. The addition of 5 parts (volume) of bentonite raises the green compressive strength to about 1.0 pounds per square inch and may be desirable for certain jobs. Additional oil, however, will be required to maintain the desired baked strength. Cores for magnesium castings should have a minimum of oil and should be baked thoroughly. Temperature of baking will be dependent on the oil but generally will be between 400 and 450 degrees Fahr. Driers are used extensively, due to the high dimensional accuracy required in aircraft castings.

Cores necessarily are soft and to facilitate pasting, the joining surfaces are painted with a 1 to 3 shellac-alcohol solution to give a stronger surface. Care is taken that the

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paste does not come through to the surface of the core with resultant danger of a blow. Joint lines and shallow surface defects may be smoothed with the following mixture made up to a soft paste with denatured alcohol containing a little oil for bond:

Talc	25 parts
Sand (200 mesh)	75 parts
Sulphur	2 parts
Boric Acid	2 parts

The area is thoroughly dried by torch or by returning the core to the oven.

Chills are placed in the cores where necessary and may be either of the round button type or formed to fit the contour of the casting surface. Cast iron generally is used as it is cheap and does not alloy with molten magnesium. The greatest objection to copper-base chills is the contamination of melts from chills adhering to scrap castings. Some operators prefer to score the face of the chill to avoid blows, but this does not appear to be necessary if precautions are taken to prevent condensation of moisture on the chill. This is best accomplished by the use of some type of a coating which must be thin and contain no material which will give off gas upon contact with the hot metal. A suspension of talc in alcohol containing either ½ per cent mazein or rosin makes a satisfactory coating material. It is necessary that the chill be clean and free from any rust or moisture.

Cores which do not go directly from the baking racks and assembly benches to the molding floor are stored in a room which is maintained at a temperature of at least 100 degrees Fahr. This insures that the cores will be thoroughly dry when placed in a mold and eliminates the foundry troubles incident to damp cores.

This is the first of two articles on the production of magnesium alloy castings in sand. The second and concluding article will be presented in the April issue.

THE EDITORS

United States department of labor, division of labor standards, recently has issued bulletin No. 39, part I entitled, *Handbook of Federal Labor Legislation*. This part deals with the standards on government contract work and work financed by the federal government, and other parts, to be issued later, will be devoted to other types of labor legislation of more general application, such as the Wagner labor relations act, the fair labor standards act, the railway labor act, etc. The present volume may be obtained through the superintendent of documents, Washington, for 35 cents.

Increase Carbon

To eliminate the use of special high-carbon pig iron, and low phosphorus hematite pig irons in the production of chilled cast iron, two German investigators suggest the use of a small amount of pitch coke with foundry coke as the fuel. With a charge composed of 15 per cent basic pig iron, 10 per cent hematite pig, 5 per cent steel scrap, and 70 per cent chilled scrap the average Shore hardness of the chill was 73 as compared to an average hardness of 67 for a charge comprised of 53 per cent special high carbon pig, 13 per cent basic pig, 5 per cent steel scrap, 25 per cent chilled scrap, and 4 per cent additional material not described. The latter was melted with 12 per cent foundry coke, and had a total carbon content of 3.46 per cent. The charge low in pig iron was melted with 9 per cent foundry coke and 3 per cent pitch coke, and the iron contained 3.64 per cent total carbon.

Haynes Foundry Equipment Co., Kalamazoo, Mich., has moved to a new location at 1734 Lake street, which provides a larger and better warehouse.

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DEFENSE TRAINING PROGRAM

(*Continued from page 47*)

tion to the next in making a suitable mold. It will be noted also that the same system is incorporated in other instructions which follow:

Making a flat back casting. Sand conditioning and why.

1. Arrangement of pattern. Convenience for pouring.
2. Sifting sand. Size and kind of riddle.
3. Pein and butt ramming. Use of bench rammer.
4. Striking off. Use of strike off and why.
5. Venting. Use of vent rod and why.
6. Bottom plate—roll over.
7. Making a flat back parting. Use of trowel.
8. Setting sprue plugs. Use of sprue gates and risers.
9. Sift parting compound. Parting compounds—what made of.
10. Sift sand.
11. Pein and butt ramming.
12. Strike off and vent.
13. Make pouring sprue. Reason for this—pours easy.
14. Lift off cope and turn over.
15. Clean parting and swab pot. Use of water bottle.
16. Rap pattern and draw. Use of draw spike and rapping bar.
17. Patch loose parts. Use of lifter, spoon slick.
18. Cut plain straight gate. Use of gate cutter.
19. Set cope in place.
20. Weight down or clamp. For safety to man and casting.
21. Pour off. Handling molten metal.
22. Shake out. Removing casting from sand.
23. Clean, chip, grind and inspect. Prepare for shipment.

Various types of bench jobs are considered in the following list under the headings—jobs, practical work, operations and technical:

Type No. 2. Even parting green sand core. To make molds from patterns with green sand cores. Same as job No. 1, ramming cores, gating. Kinds of cores. Uses of cores when green sand cores are used.

Type No. 3. Even parting dry sand core. To make molds from the patterns with core prints and using dry sand cores. Same as job. No. 1 & 2, setting cores, securing cores, venting cores, gating. Requirements of dry sand cores.

Type No. 4. Un-even partings on solid patterns. To make molds from patterns with uneven partings. Same as 1, 2 & 3, coping down rapping through the cope gating. How to find parting and necessity of easy parting.

Type No. 5. Uneven patterns, green sand and dry sand core jobs. To make molds using false cope. Also using sand match. Bedding patterns in drag. Same as 1, 2, 3, & 4, ramming false cope, making match. Reasons for using false copes and hard sand matches. Production methods.

Type No. 6. Split patterns. To make molds from split patterns. Same as 1, 2, 3, 4 & 5, ramming cope and drag, securing green sand, and dry sand cores, gating, lifting patterns in cope, loose pieces. Reasons for splitting patterns.

Type No. 7. Gated metal patterns. 1. Setting match, pattern and drag in position. 2. Ramming drag. 3. Rolling over and ramming cope. 4. Rapping through cope. 5. Coping off and drawing patterns. Same as 1 to 6 with additional practical work. Production methods used in industry.

Following are typical of the questions used to test the trainee while he is working on Unit No. 1:

1. What is molding sand composed of?
2. What is a dry sand core?
3. What is a green sand core?
4. What is a flask and what is it composed of?
5. What is a rammer?
6. What is a jacket?
7. What is a straight edge?
8. What is a vent wire?
9. What are soldiers?
10. What is a slick?
11. What do we draw patterns out of molds with?
12. What is a sprue pin?
13. What is a riser?
14. What is a bottom board?
15. What is the difference between molding sand and other sand?
16. What is parting sand used for?
17. What is a pattern?
18. What are some core binders?
19. What is a ladle? Name type.
20. Why do we use cores?
21. Why do we use a flask?
22. Why do we use rammers?
23. Why do we put a jacket or a frame around a mold?
24. Why do we use chaplets?
25. Why do we use a straight edge?
26. Why do we vent a mold?
27. Why do we use soldiers or gaggers?
28. Why do we cut a gate in a mold?
29. Why do we sieve sand over a pattern?
30. Why do we temper sand?
31. Why do we swab around a pattern?

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32. Why do we put weights on a mold?
33. Why do we use risers?

Complete the following sentences by filling in the missing words:

1. The taper on a pattern is called .....
2. The two ends of the rammer ..... and .....
3. If the pattern is rapped too much before being withdrawn from the sand the result will be a casting which is .....
4. Patterns should be rapped ..... in all directions.
5. The bottom half of the flask is called the .....
6. The board that the mold rests on is called the .....
7. The top part of a flask is called the .....
8. The opening through which the metal is poured is called the .....
9. Air trapped in the mold will cause a ..... hole.
10. If the sand is too ..... it may drop out of the ..... or the metal is likely to ..... into the sand.
11. The parting line on a pattern is where the ..... runs in opposite directions.
12. Sand is riddled over the pattern to help produce a ..... casting.
13. The gate in a mold is the opening through which the metal enters the .....
14. The main essential of a finished mold is that it be .....
15. Patterns with a flat or even cope side are known in the foundry as .....
16. A core made from the pattern while ramming the mold is called a ..... core.
17. The size and shape of the gate is determined by the ..... of the pattern the kind of ..... from which the casting is to be poured.
18. Venting allows for the escape of .....
19. A hinged flask is known as a .....
20. Cavities or holes in castings are formed by means of .....
21. The technical term for preparing the sand is .....
22. The board that is used to set the pattern on when starting a mold is called the ..... board.
23. Split patterns are usually split at the .....

Unit No. 2 in the course covers theory and practice in floor molding with different types of flasks and patterns. Job No. 1 covers routine practice with a solid pattern and an even parting. As in the former instance each operating item is followed by an information item.

What is a floor mold? The term floor molding is applied to work which is too large for the bench and is made either on the side floor, where it is handled by several men, or on the main floor of a foundry, where it is handled by the crane. Floor molds generally are made in large wood or metal flasks.

Why do we make floor molds? Larger and heavier castings can be handled on the floor. Large flasks have trunnions on the ends or sides for attaching crane slings.

Bars and chucks in a large cope reinforce the sand.

1. Prepare sand and tools. Always have sand tempered and tools in good order.
2. Select proper flask. Make sure cope and drag are large enough and deep enough to take care of the job, with holes drilled for right direction of pins.
3. Put drag on mold board plate.
4. Arrange pattern to best advantage. Allow space for adequate gating.
5. Set, if any, all chills and ram up cores. Chills are used to eliminate shrinkage at vital points. Ram up cores (dry sand cores) are used where ordinary green sand cores would not have ample strength.
6. Cover pattern with facing sand. Ram up drag in 4 inch sand layer by air or floor rammer. Facing sand is specially prepared sand to insure smooth surface.
7. Strike off drag. Drag is struck off so that bottom plate will rest evenly over entire surface.
8. Place bottom board and clamp. Clamping is done to prevent slippage when drag is rolled over.
9. Roll over drag.
10. Remove clamps and bottom board.
11. Cut to parting line if pattern has an uneven parting. If pattern has uneven parting, the sand is cut down to the parting line to allow patterns to be drawn from sand after the cope has been removed.
12. Place cope half of pattern if split pattern is being used.
13. Apply parting sand. Parting sand is used to keep the cope sand from adhering to the drag half.
14. Place sprue pin and all feeders, chills, and ram up cores if any. The sprue pin is the pattern for the opening in which the metal will be poured to reach the gate. When molten iron changes from a liquid to a solid it contracts. A feeder is used to compensate for the shrinkage by allowing hot metal to fill in at certain advantageous sections as the molten casting changes from a liquid to solid.
15. Cover pattern with facing sand.
16. Insert all gaggers and soldiers if any. Gaggers are angular pieces of rod used to reinforce sand at advantageous positions. Soldiers usually are pieces of wood that are used to reinforce sand in small pockets or corners where

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gaggers are too large to use. Both gaggers and soldiers usually are dipped in a wash of some kind (clay or paste) to insure good adherence.

17. Ram up cope in 4 inch sand layers. Both cope and drag are rammed in about 4 inch sand layers to insure uniform mold hardness.
18. Strike off cope.
19. Vent well. Cope is vented with a vent wire to increase mold permeability. This allows free and fast gas exit.
20. Remove sprue pin and all feeders.
21. Lift cope.
22. Remove pattern. Removing pattern leaves negative impression of the pattern which eventually will be filled with metal to form the desired casting.
23. Cut gates. Gate is the channel in which the metal will flow from the sprue hole to the pattern cavity.
24. Inspect, repair, and clean out mold. A dirty mold will and does produce a dirty casting. Inspect mold well and be sure it is clean before proceeding.
25. Set core or cores. Cores are used to hollow or form a part of the casting that cannot be made by the pattern alone.
26. Put cope back on. Cope is put back on to form top half of casting.
27. Clamp mold securely. Mold is clamped securely to prevent cope from raising or floating from the pressure when the mold is filled with metal as the mold is poured.
28. Position of weights. Weights are applied to keep sand in cope from raising or breaking out when mold is poured.

In floor molding aluminum, only change is in the use of finer sand, softer ramming, and larger gates. Sometimes chills and risers are used. Brass molding differs from iron molding only by the use of finer and larger gates and risers. The tools used for floor molding are the same as those used in bench molding.

Unit No. 2 presents the salient features of instruction needed on various types of molds made on the floor. Items are presented in columnar form under four heads, jobs, practical work, operations and technical.

References: *Foundry Work*, by R. E. Wendt, Chapter XVI. *Job Foundry*, p. 135. *Foundry Practice*, by Palmer, Chapter III.

Type No. 2. Even parting, green sand, core jobs. To make molds with green sand cores. Same as type 1. Ramming, securing, venting, gating, etc. Uses of cores.

Type No. 3. Even parting dry sand cores. To make molds with dry sand cores. Same as 1 & 2 setting cores, securing cores, venting cores. Reasons for use of drysand cores.

Type No. 4. Uneven parting jobs. To make molds with uneven partings. Green sand and dry sand cores. Same as 1, 2 & 3. Using cope as mold board, parting down, setting gaggers. Draft and the parting line.

Type No. 5. Split patterns. To make molds using split patterns. Same as 1, 2, 3, & 4. Lifting patterns in cope. Venting through cope and drag. Rapping paterns. Reason for splitting and when patterns should be split.

Type No. 6. Cope and drag. To make molds using cope patterns and drag patterns. Same as 1, 2, 3, 4 & 5 and production methods. Production methods used on floor molds.

Following are typical of the questions which might be used in testing the trainee on floor molding:

1. What is meant by facing sand?
2. Why should the facing sand for floor molding be heavier or stronger than that used on the bench?
3. What is the reason for clay washing the cope?
4. What are gaggers?
5. When must gaggers be used?
6. What is meant by tucking under the bars?
7. What is the difference between a floor rammer and a bench rammer?
8. Why do you swab the pattern before withdrawing it from the sand?
9. Why do you scratch the surface where the soft spots are before filling in with sand?
10. Why is it good practice to keep the pouring basin full while pouring?
11. What is meant by a crush in the mold?
12. What is meant by a fin on the casting?
13. What is a dry sand mold?
14. What is a skin-dried mold?
15. What is a riser?
16. What is a shrink head or feeder?
17. What is a skim gate?
18. What is a scab on a casting? What are some of the causes?
19. When clamping a mold before pouring, why is it better to use a clamping bar to tighten the clamps?
20. What is plumbago? Why are floor molds coated with this material?
21. What is sea-coal? Why is this material added to the sand?
22. What determines the shape, the size and the number of gates and risers?

To test the student's knowledge of floor molding he is asked to indicate whether any of the items in the following list is true or false:

NAME .....

General directions: The aim of this examination is to give you an opportunity to show what you have learned from

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the study of floor molding. It is not expected that you will be able to answer every question. Read the directions for each part carefully and be sure you understand what you are to do before you begin.

The letters *F* and *T* are opposite each statement. Encircle the letter *F* if the statement is false. Encircle the letter *T* if the statement is true. *Do not guess* if you are unable to decide whether a statement is true or false. Leave it alone. You will be penalized for each statement incorrectly marked by deducting one point or credit from the number of correctly marked statements.

1. When ramming a floor mold, the rammer should be kept about 1 inch from the pattern. ..... T—F
2. Pouring a mold with cold metal will cause it to shrink more than if poured with hot metal. ..... T—F
3. Gaggers are used to support hanging bodies of sand. ..... T—F
4. Before setting gaggers there should be at least 3 or 4 inches of sand under them. ..... T—F
5. Floor molds usually are made in snap flasks. ..... T—F
6. The sand for floor molding is finer and closer grained than that used on the bench. ..... T—F
7. Floor molds need not be vented.. T—F
8. Gaggers are used to keep the bars from falling out. ..... T—F
9. Before pouring, clamps on the mold usually are driven in tight with a hammer. ..... T—F
10. The parting on a floor mold always should be slicked down before closing. ..... T—F
11. Feeding a casting will help take care of any shrink holes.. T—F
12. The parting can be made any place on a floor mold. ..... T—F
13. All floor molds are rolled over. T—F
14. Sand over the top of the pattern should be rammed hard. ..... T—F
15. Tucking is the term given to ramming the sand with the fingers. ..... T—F
16. The cope should be placed in position before riddling the sand over the pattern. ..... T—F
17. Gaggers should be placed on an angle against the bars. ..... T—F
18. The pouring basin always should be kept full. ..... T—F
19. Facing sand never is used on a dry sand mold ..... T—F
20. All floor molds are made in flasks. ..... T—F
21. Wet blacking never is used on the floor. ..... T—F
22. Green sand molds are more secure than dry sand ..... T—F
23. A crush in the mold is better than a fin on the casting. ..... T—F
24. The length of the gaggers depends on the depth of the hanging body of sand. ..... T—F
25. The deepest part on the cope side should be rammed first. .. T—F

Following questions can be answered by a single word, or words, which are missing from the statement. If you cannot think of the exact word called for, but are reasonably certain that some other word is equally correct, then write it down. Your score for this part will be based on the number of blank spaces correctly filled.

26. If the casting is heavy then the facing sand will have to be richer in .....
27. If the mold is deep it should be gated at the .....
28. Letting the casting stand in the sand until it is completely cool will make it easier to .....
29. Core bearings are used to support cores at the .....
30. It is not necessary to use chaplets when a core is tied in the .....
31. Wet blacking should be applied to the mold with a ..... or .....
32. When the face of a mold is dried it is called a ..... mold.
33. When a mold is made in the floor with a cope it is called an .....
34. Letting the metal flow off when it comes up the riser tends to produce a ..... casting.
35. When a casting has to be fed the riser has to be built up to the same height as the .....
36. Allowing the metal to flow off from the riser also relieves .....
37. When starting a mold the mold board should rest on a .....
38. When using a wooden flask the clamps should be tightened with a .....
39. If the gas from the core does not have a free escape then the metal will .....
40. Feeding rods always should be ..... before using.
41. Soft spots on the cope side usually are found under the .....
42. Dry sand molds can be rammed ..... than green sand molds.
43. When molding in green sand the copes should be well .....
44. The cross pieces between the bars are known as .....
45. To check the thickness of metal and obtain the right size of chaplet to use, a piece of ..... is placed between the core and cope.
46. Chaplets are used to ..... cores, and keep them from .....
47. Face nailing a mold helps to prevent .....

This is the first of two articles on a National Defense training program. The second will appear in an early issue.

THE EDITORS.

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Abstracts

FROM WORLD FOUNDRY LITERATURE

Magnesium Castings

Magnesium Alloy Castings; Heat Treatment, Inspection and Design, by Dr. A. T. Steer, *Metal Treatment*, London, England, Quarterly, Autumn, 1940.

Magnesium-aluminum alloy castings containing 8 to 10 per cent aluminum are improved greatly by a solution heat treatment at 425 degrees Cent. (800 degrees Fahr.) for 16 to 20 hours. Heat treatment is critical relative to temperature control, and best results are obtained with gas-tight electric furnaces using an inert atmosphere of carbon dioxide. Since bulky castings with heavy sections, and those in which dimensions must be held closely, tend to distort at heat treatment temperature, precautions must be taken to provide proper support. One method is to include *tie-bars* on the castings or to use jigs.

Tie bars should be generous, and will serve a dual purpose of support, and extra feeding. In addition to solution treatment a precipitation heat treatment between 170 to 200 degrees Cent. (340 to 390 degrees Fahr.) will increase tensile strength with a reduction of elongation. The author also discusses inspection, radiography, types of defects, and importance of design.

Non-destructive Test

Magnet Powder Test (Die Magnetpulverpruefung) by W. Jaekel, *Die Giesserei*, Duesseldorf, Germany, July 12, 1940.

Like the x-rays, the magnet powder or magnaflux method is a non-destructive method of testing and depends on the physical fact that cracks or hollow spots in a magnetized metal interrupt or deflect the magnetic lines of force and are rendered visible by sprinkling the piece under test with the magnetic powder known as carbonyl iron obtained by chemical means. In more recent methods the extremely fine powder is mixed with oil and is poured over the part being investigated. Besides obtaining more uniform distribution of the powder, the oil may be colored so as to make a strong contrast with the surface on which it is used.

Improved auxiliary equipment for reducing the time required for making tests is described together with machines with motor driven chucks and rotating devices for handling mass-production articles, an automatic demagnetizer, water-cooled clamps for handling high current densities, and interpretation of the magnet powder pictures.

Large Casting

Manufacture of a 5-ton Jet Disperser, by A. H. Mackay, *Engineer and Foundryman*, Johannesburg, South Africa, July 1940.

Pattern used for production of the casting of which eight were required, was made in skeleton form, and the author describes briefly the procedure used and laying it out as well as its construction. The casting weighed about 5 tons, and was 10 feet long, 9 feet wide and 22 inches deep. First casting was made with the curved face up. Pattern was rammed in sand, and the molder had no difficulty ramming up interior due to skeleton form. Top surface of the mold was finished to conform to pattern, and then the top or cope mold was made. That was lifted off, and then sand was scraped off the drag with a strickle to give the proper metal thickness. Then the pattern was removed.

However, due to the deep ribs, considerable difficulty was encountered in finishing and blackening those portions properly, and repairing damage to surfaces. After some study for a more convenient method which would involve lowest cost for pattern changes, etc., it was decided to make the inside of the mold in cores. By that procedure no pattern change was required; the only additional equipment needed was core irons for the 15 cores forming the interior. Method of making the mold was the same as previously described except that core sand was employed for the interior of the drag. After the pattern was drawn the cores were lifted out, blacked and dried. In the order of eight castings at least 150 hours in molding time was saved, and much cleaner and more satisfactory castings were obtained.

High Duty Cast Irons

Mechanical and Physical Properties of High Duty and Alloy Cast Irons, by J. W. Donaldson, *Metal Treatment*, London, England, Quarterly Summer, 1940.

In this interesting resume the author presents in compact, tabular form pertinent data on the mechanical and physical properties of high strength and alloy cast irons. Properties discussed include tensile and transverse strength, deflection and elastic modulus, compressive strength, hardness, shear strength, torsion, impact strength, fatigue strength, thermal conductivity, electrical resistivity, thermal expansion, specific heat, and magnetic properties.

The author points out the desirability of a standard international test for the evalution of elastic modulus which would be of value to designers and engineers in the wider application of high duty irons. Brinell hardness of high duty and alloy cast irons ranges from 140 to 450 with the lower hardness in cast irons having an austenitic structure, and the higher hardness in those with a martensitic structure. Hardness in pearlitic irons varies from 160 to 250, and the hardness in general increases as the strength increases.

No definite relation is found between strength and hardness; between hardness and machinability, or hardness and wear. Austenitic irons with low brinell hardness are found to have better wearing qualities than pearlitic irons with higher hardness. In impact tests the repeated blow test gives more uniform results than the single blow test. There seems to be little direct relationship between impact strength and tensile strength. A pearlitic iron with good tensile strength has a low impact value while an austenitic iron with low tensile strength has a much higher impact value. It has been suggested that the impact strength of cast iron depends on its ability to deform plastically under load and as the plastic property is constant at about 25 per cent of the total deformation at fracture, the impact value will increase with the strength provided the plastic value does not vary from the normal. Austenitic irons have high plastic property with high resistance to shock.

Cast iron has a relatively higher fatigue strength in relation to its tensile strength when compared with other metals; an endurance ratio of 0.45 to 0.6 being obtained. Fatigue strength of high duty and alloy cast irons is not increased except insofar as the ultimate tensile strength is increased; an equally high endurance ratio being obtained with lower grade irons. Ratio of fatigue strength to compressive strength varies between 0.13 and 0.15 and the ratio of fatigue strength to transverse rupture stress approximates to 0.26.

Thermal conductivity of gray iron decreases rapidly with increase of silicon content. Values of unalloyed iron range from 0.110 to 0.135 at 100 degrees Cent. depending on composition. Alloyed irons range from 0.101 to 0.119 while heat resisting irons have a thermal conductivity range from 0.075 to 0.081 at 100 degrees Cent. Copper and nickel lower thermal conductivity similar to silicon. Influence of copper is less than half of that for silicon, and nickel 30 per cent more than silicon. Molybdenum tends to increase thermal conductivity similar to chromium and tungsten but not so marked. Aluminum even in presence of chromium has a pronounced influence in lowering thermal conductivity.

Electrical resistivity for gray cast iron varies between 60 and 100 microhms per cubic centimeter while that of austenitic irons is about 150 microhms. Coefficient of thermal expansion of pearlitic irons is approximately 1.4 x 10^{-5} over a range from 20 to 650 degrees Cent. The coefficient tends to decrease linearly with increase of carbon content, with increase of nickel up to 1 per cent, with increase in copper up to 2 per cent, with increase of aluminum up to 8 per cent, and with increase of chromium up to 0.5 per cent.

Utility Casting Alloy

A General Utility Casting Alloy, by A. Dunlop, *The Metal Industry*, London, England, May 31, and June 7, 1940.

The alloy discussed is a variation of the well known 88-10-2 in which 5 per cent nickel is substituted for a like amount of tin. In addition to possessing good physical properties in the as-cast state, the alloy can be heat treated which results in still higher physical properties. The author's investigation shows that by heating the alloy for 5 hours at 760 degrees Cent.; water quenching; reheating for 5 hours at 350 degrees Cent., and water quenching, the brinell hardness is increased from 84 in the as-cast condition to 191. In addition the tensile strength is increased from 49,000 pounds per square inch to 85,000 pounds per square inch with a reduction of elongation in 2 inches from 35 per cent to 5 per cent.

The author states that the alloy gives pressure tight castings, mentioning sections of ¼-inch withstanding water pressure as high as 1000 pounds per square inch. To obtain maximum response to heat treatment the lead content of the

alloy should be held below 0.05 per cent. In melting the author advocates use of 2 per cent manganese ore placed in the bottom of the crucible followed by copper and nickel, or remelt as the case may be. When the temperature reaches 1250 degrees Cent. the flux is skimmed off, the zinc added followed by the tin. Immediately before pouring about 0.05 per cent phosphorus in the form of phosphor-copper is added. Pouring temperature ranges from 1160 to 1220 degrees Cent.

Aluminum Bronze

Aluminum Bronze, by G. K. Dreher, *Canadian Metals & Metallurgical Industries*, Toronto, Ont., Canada, July 1940.

Due to the short freezing range of aluminum bronzes a relatively close and apparently uniform crystal appears possible. In practice even though this difference cannot exceed 2 per cent between first and last metals to solidify, it is sufficient to provide an exceptionally heterogeneous structure in the commercial usable range. Desired conditions of structure are achieved by proper cooling of the casting, time control, chills in the mold, addition of minor elements and by heat treatment.

Location of commercial alloys on the copper-aluminum diagram only can be approximated because varying methods of processing permit diversified results. Inclusion of one or more minor elements such as nickel, iron, manganese and zinc is common, and their effect on the ultimate phases of the completed alloy depends on how they are added. Those elements act as grain refiners, but actual grain size control may be had by resorting to other minerals and alkaline earths.

The author discusses various phases of aluminum bronzes including high iron alloys, slow cooling, alpha and alpha-eutectoid alloys, straight aluminum bronze alloys, 1 per cent iron, centrifugal casting, heat treatment, etc.

Corrosion Testing

Accelerated Spray Test for Determining the Relative Atmospheric Corrodibility of Ferrous Materials, by T. Swinden, and W. W. Stevenson, *Foundry Trade Journal*, London, England, Sept. 12, 1940.

This article describes briefly an improved apparatus for determining the corrodibility of iron and steel. Pieces to be tested are about 2 x 4 inches and mounted on a belt so that they may be subjected to the spray, to drying, and to washing at any predetermined cycle. Spray solution used was sulphuric acid of N/20 and N/100 concentration. The authors point out that no visible acid attack should occur, and since that took place with N/20 acid, the strength should be below that concentration.

Test results obtained from spraying specimens in the device for 20 days and 60 cycles per day, and from field tests of one year duration indicate a close agreement between the two. The authors conclude that the device offers sufficient promise to be regarded as a laboratory method for determining relative corrodibility. However, addition research and investigation may be required in developing spray solutions to simulate atmospheric attack in different sections of the country.

Melting Aluminum

Aluminum Melting Furnaces. (Aluminiumschmelzoefen) by A. von Zeerleder, *Die Giesserei*, Duesseldorf, Germany, May 31, 1940.

Due to the tendency of aluminum to take up hydrogen or other impurities during melting and casting, considerably greater importance attaches to the proper choice of melting furnace and casting methods, than in the case of the heavy metals, as the different fuels used contain varying amounts of hydrogen. The assumption that 50 per cent of all the scrap resulting in the further processing of the light metals are attributable to wrong melting or casting procedure, hardly is exaggerated.

The efficiency of the melting equipment is determined to a very great extent by the melting losses. In addition to depending on the heating medium employed, the efficiency depends also on the material to be melted. Obviously, the melting losses increase as the size of the pieces charged into the furnace decreases. Among the questions discussed are crucible and hearth furnaces, influence of the type of furnace and fuel on gas absorption, degasifying, electric heating, cast-iron and graphite crucibles, induction furnaces, costs, etc.

Cerium Additions

Effect of the Addition of Cerium to Cast Iron (Ueber den Einfluss von Cermischmetall auf Gusseisen) by W. Baukloh and H. Meierling, *Die Giesserei*, Duesseldorf, Germany, Sept. 6, 1940.

Very little has appeared so far in literature on the subject of the action of cerium or of cerium alloys on cast iron. Some of the statements which have appeared, are even contradictory. The authors give the results of their own investigations in which the test material was melted in a cupola with a forehearth, and having an output of about 5 tons per hour. The average analysis of the cerium mixture, or Mischmetall as it is sometimes known, was as follows: Cerium, 51 per cent; other rare earths, 46.9 per cent; silicon, 0.13 per cent; iron, 0.55 per cent; magnesium, 0.62 per cent; aluminum, 0.03 per cent, and calcium, 0.02 per cent.

This material was alloyed with the iron in the ladle, which held about 130 pounds. Three series of tests were made for the purpose of determining the effect of cerium on the strength properties, desulphurization and the pourability or degree of fluidity of the iron. Both the tensile strength as well as bending strength of the iron are favorably influenced by this treatment. The same applies to desulphurization. The fluidity of the iron is improved by small additions of cerium, whereas larger contents again cause it to drop, due to a pronounced formation of cerite oxides.

Chemical Analysis

Chemical Analysis of Alloy Cast Iron, by E. Taylor-Austin, *Foundry Trade Journal*, London, England, Sept. 26 and Oct. 3, 1940.

As the author points out, advances made in the metallurgy of cast iron during recent years have necessitated considerable modification in existing methods for chemical analysis. He also states that the general belief that methods developed for use with alloy steels can be applied to alloy cast irons if graphitic carbon and silicon are removed by simple filtration, is erroneous and gives rise to misleading results.

Since the author is chief chemist of the British Cast Iron Research association, and a chemist of no mean ability, he has done a great deal to develop suitable methods and manipulations to attain accuracy in analysis of alloy cast irons. He describes in considerable detail the procedures including precautions for determining first the common or ordinary elements, and then the alloy components in cast iron. Of particular interest is the recommendation of a rapid combustion method for determining sulphur, and the use of numerous organic reagents for alloy determinations.

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With a few notable exceptions, malleable iron foundries are not leading the procession. As time goes on, this will change and continuous melting, molding and pouring, coupled with efficient mold conveyors and sand conditioning systems, will be found in every modern foundry.

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Yes sir!—and "Bill" is not the only one—thousands of foundrymen will make the most of this opportunity to discuss their problems, listen to and participate in technical sessions conducted by today's industrial leaders.

The May issue of The FOUNDRY—This will be the Pre-Convention issue—previewing and highlighting the convention, giving a complete program of Technical Sessions, Plant Visitations and various social activities during the convention. This is in addition to all the regular features appearing monthly in The FOUNDRY. This is an advertising opportunity of unusual value—reaching foundrymen readers well in advance of the opening of the convention.

The June issue of The FOUNDRY—This issue will be the Post-Convention issue and will contain a complete report of the convention—what was done—who was there—and will be an accurate printed record of the 1941 convention. This feature plus all the interesting and informative material also to appear in the June issue, insures advertisers maximum attention value to the advertising pages.

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SPACE RESERVATIONS IN BOTH PRE-CONVENTION AND POST-CONVENTION ISSUES MAY BE MADE AT ANY TIME NOW

THE FOUNDRY

Penton Building **Cleveland, Ohio**